SCHOLASTIC

The American High School Weekly

VOLUME 33 NUMBER 12

DECEMBER 10, 1938

E. I. du Pont de Nemours & Company, Inc.

APPLIED SCIENCE ISSUE

H. S. TEACHER EDITION

VOLUME 33
NUMBER 12

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DEC. 10
1938

Science Remakes the World

An Editorial

SEVENTY years ago an English schoolboy, home for his Easter vacation, spent his time fussing with chemicals in a home-made laboratory. His college wasn't open enough hours to satisfy him, and he would rather work than eat. His professors had told him that quinine, a drug made from the bark of the Peruvian cinchona tree, was very expensive. He thought he'd try to find a substitute. He mixed dozens of sticky messes in his test-tubes, and none of them turned out to be quinine. But once, when he was washing out a beaker with black, tarry stuff clinging to the bottom, he found the water had turned a beautiful, deep purple. That was mauveine, the first anilin dye, and the boy was William Henry Perkin, one of the world's greatest chemists.

For three thousand years the only source of royal purple had been a foul-smelling liquid found in the shell of the murex, a Mediterranean snail. The dye was first used by the Kings of Tyre to color their royal robes, but it was costly and difficult to get.

Today anyone can walk down to the corner drug-store and for ten cents buy a package of dye in any color—brighter, better, and more lasting than royal purple. These packaged dyes are all made from coal-tar, descended from Perkin's experiment. The test-tube has outdone nature.

Not only dyes of every hue in the rainbow, but hundreds of other useful things are made by "synthetic chemistry" from such unpromising substances as coal-tar,—perfumes and flavoring extracts, essential drugs like aspirin, anesthetics like novocaine, plastics like bakelite and pyralin. "You can't make a silk purse out of a sow's ear," says the old proverb. But the modern chemist answers, "Perhaps not, but I can make silk stockings and velvet dresses out of wood-pulp, cotton linters, and coal."

Chemists, physicists, inventors, engineers—they are the captains of industrial progress today. In less than a century they have changed the face of the world. They have made over our lives from a simple handicraft, rural routine to the Aladdin-like world of the machine and power age. These things are in the air we breathe, and every boy and girl knows something of science. The man on the street has come to expect that anything can happen. Indeed, his faith may be greater than his knowledge, for he can even believe that Martians are invading the earth when he hears it over the radio.

But the gifts of science may carry the bane of Midas. That greedy king, you remember, was granted the privilege of making one wish. He foolishly wished that everything he might touch should turn to gold. But he forgot to leave out food and drink and nearly died of thirst and hunger. Science gives man goods, comforts, and conveniences far beyond the dreams of Midas. But its gifts, in the hands of the selfish and unenlightened can become awful weapons of human destruction. Physics and chemistry have produced the deadly bombing plane, explosives, and poison gas. Machines do more and more of man's work, but they also crowd out men and take away jobs. Radio can serve the world's desire for information in an hour of crisis, but it also provides a lot of cheap claptrap and advertising. These are not the fault of the scientists, but of men who abuse the scientists' gifts. Man must learn to use applied science wisely for human betterment.

In this special number of *Scholastic*, we can present only a few of the high spots of applied science. From Benjamin Franklin to General Electric, America has been a nation of inventors. Here we have tried to bring invention up to date, within our space limits. But it moves too fast for us. Today's applied science will be out-dated tomorrow.

SCHOLASTIC: Combined with Magazine World, Current Literature, World News, Current Topics and Our World Today • Published every week during the school year, September through May inclusive except during school holidays at Thanksgiving, Christmas, Mid-Term and Easter • Published by Scholastic Corporation, Chamber of Commerce Bldg., Pittsburgh, Pa., M. R. Robinson, President; G. H. McCracken, Vice President; A. K. Oliver, Treasurer • Contents copyright, 1938, by Scholastic Corporation, and may not be reproduced without written permission. Title registered, U. S. Patent Office. Entered as second class matter at the Post Office at Pittsburgh, Pa., under Act of March 3, 1879. Additional 2nd class entry at Dayton, Ohio •

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BENJAMIN FRANKLIN

He Not Only "Invented" the United States of America But Was the Leading Scientist of His Day

By Roger Burlingame

Lamp-post invented by Franklin

BENJAMIN FRANKLIN was the supreme inventor. He had unlimited curiosity and vast capacity for reflection. He was primarily practical. He was in constant rebellion against the limitations of his era and ended by overthrowing it. His mind was far in the future; his dream was the America we know. Moreover we have that America because he dreamed it.

He was a product of an unspecialized age in that he was a jack-of-all-trades. He violated the proverb by becoming master of at least half a dozen. Some of them he created. In the course of his life he was a printer, journalist, columnist, writer, salesman, advertising man, promoter, publicity expert, civic organizer, fireman, postmaster, librarian, military architect, quartermaster, soldier, legislator, diplomatist and statesman. He was also a scientific discoverer, a practical inventor, an amateur mathematician, a philosopher, an innovator in navigation, transport, hygiene and sanitation, city planning, street-lighting, paving and cleaning, hospitalization and higher education. He was a wit, satirist, humorist and hoaxer, a political agitator, a maker of slogans, maxims and wall mottoes, a promoter of clubs, associations, secret societies, lodges; a good mixer, a vulgarizer of the arts and sciences, a lobbyist and a politician. He made considerable contributions to meteorology and medicine, he introduced an ideal of cleanliness into an era when bathing was still a lick without a promise and he was an athlete in a sportless age.

We are interested in him as an inventor but we must extend the definition to cover something beyond applied science. Many modern institutions which hold together the present structure of society and so contribute largely to progress in applied science are based on his inventions outside that field. Balzac suggested that he "invented the United States." This is a large claim, yet we can hardly pass it by. The idea of union was undoubtedly his. He was one of the first to see the fading of a tired colonial policy. He made the American spirit articulate. And it would be difficult not to suggest also that he invented American humor.

Benjamin's father, Josiah, was an immigrant from England. He had been trained as a dyer but he found little demand for that trade in America where dyeing was still a handicraft. So he adopted the industry of making tallow candles for sale. Candle-dipping had become an intolerable bore to the housewife, especially in the city.

Benjamin was his twelfth child. There were two after him. This was not a prodigious family for the period—with two wives to produce it. Abiah Folger, the second, bore most of the burden. One boy, goaded by the devil which occasionally jumped in the Franklin blood, had run away to sea. Another practised the magic art of printing. The rest of the family worked at the candle molds.

The printer of the day was still regarded as something of a magician. Next to the minister, he was the most erudite man in town. If he printed a newspaper, he was its editor, reporter and commentator as well as its printer. Benjamin's brother James had a paper. He somehow managed to lead the boy away from the wharves where he was already swimming like a fish and learning the ropes of ships, and brought him into the magic of his shop. Here the mechanics of the press charmed him and the means of articulation tickled him. Books were already his passion. Here they were spread about in the intimate processes of their making. At twelve, he was apprenticed to his brother, bound by the hard rules of the engagement. The smell of the ink had driven the salt from his nostrils.

At seventeen, he ran away to New York and thence to Philadelphia, the home of his lifetime. It would be useless here to tell the story of his escape, his early efforts to get established as a printer in Philadelphia or the trick played on him by Governor Keith, sending him on a wild-goose chase to London. Back in Philadelphia in the fighting years when he established himself as a printer, journalist, bookseller, shopkeeper, almanack writer, political agitator and defender of every cause of freedom, he seemed to forget about science. He had not forgotten as we can see by the writings of "Poor Richard."

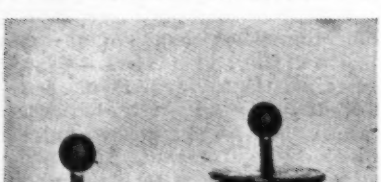
The almanack was an old invention. Franklin made it American. He adapted it to wide lands and a special climate. He made it readable and witty. He made it intensely practical, explaining or laughing at the magic. He included recipes, contrivances, methods, processes, handicrafts, machines of his own invention for household use and advice on personal hygiene. He made it, incidentally, political, moral, religious—and a manual of self-improvement imitated today in all the wake-up-and-

David Martin's portrait of Franklin at 61. It now hangs in the Pennsylvania Academy of Fine Arts in Philadelphia, Pa. This reproduction is reprinted from Carl Van Doren's excellent new biography, *Benjamin Franklin*, published by the Viking Press, New York.

live - alone - outwit - your - nerves - be - glad - you're - a - whatnot tracts that flood the twentieth century markets.

His meteorological knowledge came to his aid in the almanack. His hygiene, learned by trial and error, was not called science in his day though it later became so. He introduced a temperate diet of vegetables into thousands of salt-pork-ridden farms. He was the first to talk practically, not morally, about the effects of alcohol. He brought fresh air for the first time into the American home. His theory of the sanitary value of ventilation, his belief in the breathing of the skin, was entirely new and he demonstrated it by sitting naked for hours in the draft from his wide-open window.

He wrote about earthquakes, waterspouts, whirlwinds, eclipses and storms after long research and



Leyden jars, improved by Franklin, are now in Franklin Institute, Philadelphia.

study. We find him studying these things in his early thirties (1737-8) and, as he wrote of them in his Philadelphia newspaper, *The Gazette*, becoming more and more engrossed in them. By 1749 he wanted to give up all other work for science but by that time his public activities had become too important to the world and he could not abandon them. Through all his life this desire pulled at him; happily for America, other immediate exigencies pulled harder. And, as he was essentially practical, his scientific thought was adapted to invention.

In 1742, he invented the "Pennsylvania fireplace" which later became known as the Franklin stove. This was the first application of the principle of heating by warmed fresh air. This invention came into a nearly stoveless world. The Dutch and the Germans has brought a few of their traditional stoves—devices for heating the already stale air of the rooms. The nearest thing to a stove in the English settlements of America was the iron foot-warmer —a box containing coals—which was used in the New England churches. Franklin, writing of his invention, gives a picture of the kind of hardship that it would overcome: "That your whole Room is equally warmed so that People need not croud so close round the Fire, but may sit near the Window, and have the Benefit of the Light for Reading, Writing, Needlework, &c. They may sit with comfort in any Part of the Room, which is a very considerable Advantage in a large family."

The stove was one of his many gifts to the world. He made no attempt to patent it. On the contrary, when the governor offered him a patent for the "sole vending" of it for a term of years, he "declined it" as he wrote in his Autobiography, "from a principle which has ever weighed with me on such occasions, viz., *That as we enjoy great advantages from the inventions of others, we should be glad of an opportunity to serve others by any invention of ours; and this we should do freely and generously.*"

The stove had an immediate success. Cast iron was now made in sufficient quantity in the colonies to render its manufacture easy. It was especially popular in cold New England, and all through the century, we find advertisements of it in Boston newspapers.

In 1746, he began his electrical studies. The year before an invention called the Leyden jar—a new device for the storage of electrical energy had come out of Holland.

His inventions were his improvements in the jar itself by the use of pulverized lead instead of water; the Franklin pane, an adaptation of the jar by using a pane of glass coated with foil (later used in wireless telegraphy and electrotherapeutics), various electrical machines, the famous kite with its wire conductor, its wet twine, its key and its silk insulator (kept dry in a doorway) and his adaptation of the kite—the lightning rod. Most of these were not important enough to a history of invention in America to need further detail here.

Franklin's other contributions to science—both discovery and invention—were made at intervals throughout his life; wherever a moment intervened between the strenuous exigencies of his public work his insatiable curiosity was active. On his voyages, sitting as clerk of the Assembly oppressed by the speeches of incompetent legislators, or sitting at home when the day's work was over, his tireless brain went back into the thrilling mysteries of "philosophy." It took the place of detective stories read so eagerly for relaxation by the public men of today.

In 1752 he experimented with conductors of heat, laying fabrics of different colors on the snow and carefully observing the rapidity of melting beneath them. In 1758 he wrote of cooling by evaporation, having experimented first by the effect of sweat upon his own body and by blowing with a bellows upon the dry ball of a thermometer. Wind, he showed, cooled only by causing quicker evaporation.

In the fifties also, when he was bored by the Assembly, he invented his "magic squares," not of great value to mathematicians but a startling mathematical game. In 1763, while abroad, he invented for his friend Giambatista Beccaria, an

Franklin's Pennsylvania Fireplace was an immense comfort to a stoveless age.

Italian musician, the "Armonica." This was an application of the "musical glasses" much in vogue abroad, a device for playing with wet fingers on the rims of glasses. Glasses of ascending pitch were strung on a rotating spindle. In 1768, he wrote of the cold air bath, explaining the action of the pores of the skin. In 1768, he also found that vessels of slight draft moved faster than deep ones in a canal. In 1769, he charted the Gulf Stream.

In 1773, he proved the enlivening properties of sun rays, now called vitamins. He did this by revivifying flies which had been drowned in wine. The following year he found marsh gas in New Jersey and wrote the first description of it. In his old age (1784), when his eyes had flattened and he needed two pairs of spectacles, one for far sight and one for near, he invented bifocal eyeglasses.

(Continued on page 6)

APES in AIRPLANES

Man's Power Is Greater Than His Wisdom

By C. E. M. JOAD

Cyril Edwin Mitchinson Joad is a well-known British philosopher who has, at the age of 47, over thirty books to his credit. Since 1930 he has been head of the Department of Philosophy and Psychology at Birkbeck College, University of London. *Time* sums up Mr. Joads' attitude toward our modern civilization by commenting that "his objection to science appears to be that it does not provide enough digestive pills of wisdom to go with its banquet of knowledge."

OUR civilization is in a curious predicament. Peace, prosperity and plenty are in our grasp; yet we seem bent on destruction. Mankind, having invented a most wonderful machine, finds that something is radically wrong with the works; science, which should have been our good fairy, has become our evil genius. For it is science that invented the machine. Thanks to science, all the age-old enemies of man have been conquered — all except one.

Look back over the past of human life and you will see what a meager, what a sordid affair it has been. Man's communities have been at the mercy of powers which he could not control; they have been wrecked by fire and flood; they have been the prey of pestilence and disease. With the sweat of his brow, man has wrung a scanty living from nature.

Today, thanks to science, these enemies of human life belong to the past. Plenty and comfort are available for all if we could but learn to use the gifts with which science has endowed us. But we cannot, at least we do not, for there remains the one enemy which science has not and cannot conquer—the enemy within the gates, the enemy which is human nature itself. Human power has increased but human wisdom has stood still, so that while science has given us powers fit for the gods we bring to their use the mentality of savages, of madmen, or of robots.

Look for a moment at the wireless. Men of genius by the dozen, men of talent by the hundred labored that wireless might be. They succeeded, and with what result? The ether vibrates to the strains of Negroid music.

Or, to take a more sinister example, look at that airplane humming across the summer sky. The knowledge of mathematics, of dynamics and mechanics, of electricity and internal combustion, the ingenuity in the application of that knowledge, the skill in the working of woods and metals that have gone into its making are such as to suggest that its inventors were supermen; the intrepidity and courage which were shown by the early flying men were the qualities of heroes.

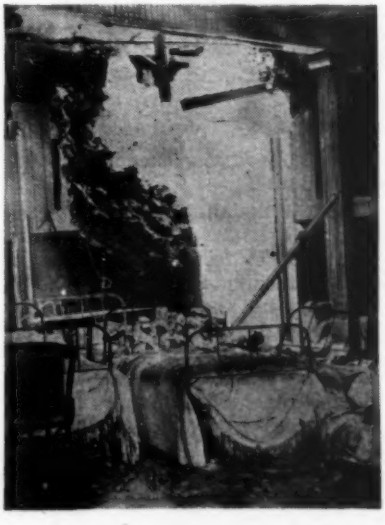
Think now of the benefits which the airplane might have conferred upon mankind; of how it might have brought all the countries of the world to John Smith's back door and made Bagdad as accessible as Balham.

Now think of the purposes for which the airplane has been and seems increasingly likely again to be used. To drop bombs that shatter and choke and burn and poison and dismember defenseless people, so that modern war has become, in the words of a lady novelist, "a running away with one's children and a not being able to run fast enough." These, it is obvious, are the purposes of idiots or devils. In a word, the supermen made the airplane and the savage has got hold of it.

Or consider medical science. Think of the skill which it has achieved in holding life in aging bodies and repairing failing ones. Yet at the same time chemical science has achieved an even greater skill in shattering and poisoning them, with the result that in the last war civilization staged the spectacle of all the resources of medical science being used to patch together broken bodies in order that all the resources of chemical science might be used to blow them to pieces again.

Our power, it is obvious, is greater than our wisdom. Just think of the things that science can enable us to do. We can talk across continents and oceans; install television sets in the home; listen to Big Ben striking in North Borneo; travel on the ocean or under it at our pleasure.

Photographs speak and sing; X-rays are the windows through which we can photograph our insides; crops are ripened by electricity; hair is waved by electric current; roads are made of rubber; teeth filling is comparatively painless.



These photos show a striking contrast in man's use of the airplane, one of his greatest scientific achievements. Right is Bradford Washburn, noted flying explorer and photographer, whose aerial surveys of Alaskan mountains have added to the store of man's knowledge. Below: the remains of a Spanish hospital after an air raid by the insurgents.

Yet, we cannot, in the midst of our enormous cities, afford a little space where poor children can play in safety and comfort, with the result that in our desire for speed we kill one another at the rate of 6,000 a year and mutilate one another at the rate of 250,000 in England.

What a mad new world is this in which men can fly in the air like birds and swim under the sea like fishes, yet how to walk upon the earth they do not know!

Consider finally the case of ma-

chines. Machines were invented in order to relieve mankind of dull and drudging work. The ordinary citizen nourishes a dream wherein after three or four hours' machine-minding a day he will have produced enough and to spare, after which he will, presumably, have nothing to do but enjoy himself. But two things have combined to prevent the realization of this dream.

In the first place, the new leisure which the inventor of machinery has made available for men, instead of being distributed evenly among us all, is concentrated in the form of unemployment upon a certain number who do not want it, while the rest of us work as hard or nearly as hard as we worked before.

In the second place, instead of using machines as our servants, we have grown so dependent upon them that they have become our masters. We cannot now perform the simplest operation of life without their assistance.

More and more the ordinary man delegates the functions of living to pieces of mechanism; he no longer makes music for himself, he turns on a phonograph. He no longer makes conversation; he listens to a talk on the radio. Increasingly he lives a "press the button" existence. To step on foot throttles, insert coins in metal slots, crowd through clicking turnstiles, turn on the radio, hurl oneself over the surface of the earth in mechanisms propelled by gasoline—these constitute his notions of enjoyment.

Deprived of them we should be bored to extinction. Even as it is we do not know what to do with the extra time with which the increased speed of transport has presented us; for the sake of a few minutes we scramble madly on trains and buses as though it were a life and death matter. The average man will move heaven and earth to save five minutes and not have the faintest idea what to do with them when he has saved them.

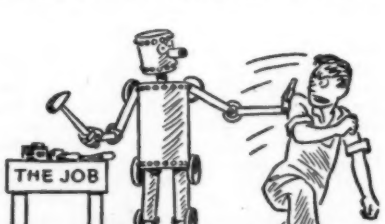
Now look forward to a future in which the average man's dream is realized, and, assured of comfort and a competence in return for three or four hours' machine-minding a day, for the remaining ten or twelve he has nothing to do but amuse himself. What would his world be like?

Whatever land is left over from cultivation would be covered with a network of tennis courts or golf courses, or whatever kind of ground the popular game of the future demands. The roads would be covered with a mass of stationary cars wedged in a solid and inextricable jam. The coast-line will be ringed with a continuous series of resorts at which jazz bands will discourse Negroid music to tired sportsmen and their over-nourished wives.

A deluge of news carefully chewed so as not to arouse comment or to exercise thought will descend upon the defenseless heads of the community by every device of television and telephonotony that the science of the future may have been able to perfect. Man will have mastered nature and satisfied his material needs, but will be totally unable to find respite from boredom or a solace for his sick soul. Finally he will be driven to make life hard and difficult once again in despair at finding tolerable an existence where machines have usurped most of the functions of living.

You see what I meant when I said that the enemy which remains for man to conquer is the enemy within himself. Potentially we are masters of the world, yet we are on the verge of committing mass suicide through sheer inability to control the powers that science has given us.

Mind, I am not saying that we are any worse than we ever were; merely that we have a need to be very much better — much better because we are so much more powerful. The point is simple enough. Give a schoolboy an airgun and he may break a few windows or shoot a sparrow or two; give him a modern rifle and he becomes a public danger. That



From *You and Machines*
University of Chicago Press

is precisely what science has done to modern man.

How is the situation to be remedied? No doubt, the best course would be to increase our wisdom, but, unfortunately, the recipe for wisdom is not known. What remains? To arrest the growth of our power, the power that we do not know how to use? We could, of course, lock up the inventors, but I am not sure that it is necessary to do anything so drastic as that.

Suppose that we were to establish a board containing some philosophers, some scientists, some politicians and some "men in the street" and charge it with the power of censorship over inventions. It would not prohibit inventions, but it would control their publication. No fresh marvels would be let loose upon the community unless there was some assurance that men could use them—use them, that is to say, without turning themselves into savages, or imbeciles, or robots. If we could only call a halt to science, if we could only, by some means, arrest this flood of inventions, then we might gain a little time to adjust ourselves to the use of the new powers with which we have been so embarrassingly endowed.

Reprinted from *The Living Age*, by special permission.

Benjamin Franklin

(Continued from page 4)

In his late years, also, he was immensely interested in aeronautics, studied the balloon ascensions of Montgolfier in Paris, suggested daylight-saving time and wrote of watertight compartments for ships. But in many of these ideas he was far ahead of his time and it took years for the world to catch up with him.

We must go back through the years to the cultural inventions which had a far more immediate influence on American society than the scientific ones. Through these he elevated standards of living and organized the spiritual forces of the American people. Without them we might have been long delayed in the understanding of independence; we might, indeed, never have become a nation.

In 1730, when he was only twenty-four, he started the first circulating library in America. It began in his little club, the Junto, whose members pooled their books for borrowing. Then he got fifty subscriptions at forty shillings each and sent to England for a hundred books. The library became successful and was given a charter. "This," he wrote, many years later, "was the mother of all the North American subscription libraries, now so numerous." He did not live to know that it was to become a great American institution—one which should make the United States unique in the world.

He then turned his attention to civic organization in his own city. In 1737, he studied the "city watch," the only constabulary which existed in Philadelphia. He found it full of holes and graft. In the same year he invented the city-organized and city-paid police force and soon after created the first fire department—a bucket brigade. In 1743, he organized a militia for de-

(Concluded on page 34)

Journey to the Forks

Scientific Knowledge Was Sadly Lacking in the Mountains, but These Boys Were Out for an Education

By James Still

"IT'S a far piece," Lark said. "I'm afraid we won't make it before dusky dark." We squatted down in the road and rested on the edge of a clay rut. Lark set his poke on the crust of a nag's track, and I took the saddlebag off my shoulder. The leather was damp underneath.

"I'm afraid we ought never thought to be scholars," Lark said.

The sun-ball had turned over the hill above Brack Hargin's farm, and it was hot there in the valley. Grackles walked along the top rail of the fence, breathing with open beaks. They stopped and looked down at us, their legs wide apart, and rusty backs arched.

"I knowed you'd git dolesome before we reached John Little's Creek," I said. "I knowed it was a-coming."

Lark drew his thin legs together and rested his chin on his knees. "If'n I was growed up to twelve like you," he said, "I'd go along peart. I'd never give a mind to my hand."

"Writing ain't done with your left hand," I said. "It won't be agin you larning."

"I ought never tried to bust that dinnymite cap," Lark said. "It's a hurting sight to see my left hand with three fingers gone."

"Before long it'll look plumb natural," I said. "In a little spell, they'll never give it a thought."

The grackles called harshly from the fence.

"We'd better eat the apples while we're settin'," I said. Lark opened the poke. There was a horse apple and a Ben Davis left. "You eat the little Ben," I said. "I like an apple that pops when I bite it."

Lark saved the damp seeds, wrapping them in a scrap of paper torn from the poke. I got up and shouldered the saddlebag. The grackles flew lazily from the rails, settling into a linn below the road, their dark wings brushing the green leaves like shadows.

"It's still nigh on seven miles to the forks," I said.

Lark wanted to carry the saddlebag, letting me rest.

"This load would break your bones down," I told him. I let him have my brogans though. He tied the strings into a bow and hung them around his neck.

We walked on down the road, stepping among the hardened clumps of mud and the wheel-brightened rocks. Cowbells clanked in a redbud thicket on the hills, and the bellow of a calf came out of a cove. A cherrybird hissed in a persimmon tree. I couldn't see it, but Lark glimpsed its yellow wax tail feathers.

"A cherrybird is nigh tame as a pet crow," Lark said. "Oncet I put my hand on one setting some eggs, and she never flew away. She was thet trusting."

Lark was tiring now. He stumped his sore big toe twice, and he cried a little the second time.

"You'll have to stop dragging yore feet or put on shoes," I said.

"My feet would be raw as a beef if I wore shoes all the way till dark," Lark said. "My brogans is full o' pinchers. If'n I had me a drap o' water on my toe, it would feel a sight better."

Further on we found a spring drip, and Lark held his foot under the cool, thin stream. He wanted to scramble up the bank and find where the water seeped from the ground.

"Thar might be a spring lizard sticking his head out o' the mud," he said. But we went on, the sun-ball in our face and the road curving out of sight beyond.

"I hear tell they do quare things at the Fork-school," Lark said, "but I forgot what it was they done."

"They got a big bell hung square up on some poles," I said, "and they ring it before they get up, and when they eat. They got a little sheep bell they ring in the schoolhouse before and betwixt books. Rutt Smith tuk a month's schooling there, and he told me a passel. Rutt says it's a sight on earth the washing and scrubbing and sweeping they do thar. Says they might nigh take the hide off the floors a-washing them so much."

"I bet it's the truth," Lark said.

"I heard Mommy say it ain't healthy keeping dust breshed up in the air, and a-damping the floor ever day," I went on. "And Rutt says they got a passel o' cows in a barn. They take a wet broom, and scrub ever cow before they milk. Rutt says he reckons by now they'll be breshing them cows' teeth."

"I bet it's the truth," Lark said.

"I figger all that messing round don't hurt them cows none," I said. "They git so much milk everbody has a-plenty."

The sun-ball dropped behind the beechwood on the ridge-top, and it was cooler now. We rested again in a horsemint patch, Lark spitting on his big toe, easing the hurt. "I ought never thought o' being a scholar," he complained.

"They never was a pure scholar amongst all the Baldridges," I said. "Never a one went all the way through the books and come out yon side. I got a notion doing it."

"I figger it'll take a right smart spell," Lark said.

We were ready to go on when the sound of hoofs came up the valley. They were afar off and dull against the rocks. We waited, resting this

(Concluded on page 37)

"I reckon John Baldridge is sending his young 'uns down to school," Quin said, drawing up his heavy cheeks, laughing.

Buried Treasure for 6938 A. D.

By Joan Coyne

MEN have always been gnawed by a great curiosity about what life was like on this planet before their own times. That is why archeologists have devoted their lives to trying to rebuild the ancient civilizations that existed thousands of years before the time of Christ. Today we believe that this interest in the past will continue in the future. That is why arrangements have been made to preserve mementoes of this year 1938 and give the archeologists and historians of the future some hints as to how and where to find traces of our own civilization.

The Time Capsule, buried 50 feet below the ground by the New York World's Fair and built by the Westinghouse Electric & Manufacturing Company, is an effort to bridge 5,000 years by means of a metal object that looks something like an unexploded bomb. The directions for finding this storehouse of relics of the year 1938 are contained in the Book of Record of the Time Capsule. Perhaps the book may not survive and the treasure may be found by chance. Perhaps it will lie beneath the ruins of the gigantic metropolis of America. Perhaps many civilizations will be built above it. Perhaps it may never be found, for it may be destroyed by some natural or man-made upheaval of the earth.

But if the treasure is preserved for 5,000 years what will its finders think of it? It contains a "cross-section" of our times within its metal shell. Scientists, engineers, archeologists, scholars and the public in general all contributed their ideas of what should be included.

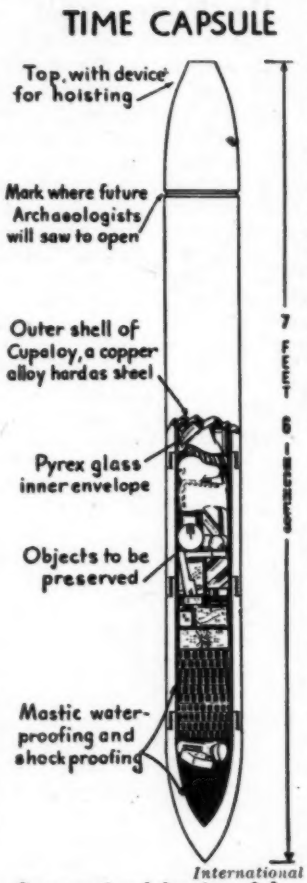
A copy of a newspaper for August 10, 1938, a variety of books, including a mail order catalogue, *Donald Duck*, an Encyclopedia Britannica, *Gone With the Wind* and a number of magazines were all recorded on microfilm and their contents, squeezed into four small rolls, were packed in. A Key to English was included. A newsreel of a fashion show, a Roosevelt speech, fleet manoeuvers, and the bombing of Canton were also chosen. To show what we use in our daily life a number of homely and familiar objects were selected — an alarm clock, nail file, poker chips, etc., (see illustration at left, below).

Three of the greatest men of our day wrote messages to the world of 6938. Those messages were composed while the European war crisis of September was at its tensest pitch. All reflect the sadness of thinking men at the spectacle of wayward and destructive humanity. Albert Einstein, the great mathematician, said, ". . . people living in different countries kill each other at irregular time intervals, so that . . . any one who thinks about the future must live in fear and terror. This is due to the fact that the intelligence and character of the masses are incomparably lower than the intelligence and character of the few who produce something valuable for the community."

Dr. Millikan, a famous physicist said, "If the rational, scientific, progressive principles win out in this struggle there is a possibility of a warless, golden age ahead for mankind. If the reactionary principles of despotism triumph, the future history of mankind will repeat the sad story of war and oppression as in the past.'

Thomas Mann, the German writer, concluded his message in much the same spirit, "What we, in this year of our Lord, 1938, understand by the term 'culture' — a notion held in small esteem today by certain nations of the western world—is simply this endeavor (to humanize man). Brothers of the future, united with us in the spirit of this endeavor, we send our greetings."

The Time Capsule is sealed so as to be perfectly water-tight and its interior is a gas-filled chamber of glass which will preserve the contents. As a guide to its finding, the World's Fair has distributed 3650 copies of the Book of Record to libraries and museums. It contains a description of the contents and detailed instructions for finding, raising, and opening the Time Capsule. The paper, ink and binding are all prepared for durability.


TIME CAPSULE
Top, with device for hoisting
Mark where future Archaeologists will saw to open
Outer shell of Cupaloy, a copper alloy hard as steel
Pyrex glass inner envelope
Objects to be preserved
Mastic waterproofing and shockproofing
7 FEET 6 INCHES

International

Cross sectional drawing of the Time Capsule, made of cupaloy, a new hardened copper.

Keystone View

International

Left: A woman's hat was the last item to be placed in the Time Capsule before it was sealed. Right: Frosted top which has been chilled by dry ice, being screwed on. When the cap warms up to the temperature of the Capsule, the joint will be virtually solid metal.

MAP OF AMERICAN INVENTIONS
Canada
ME.
VT.
N.H.
MASS.
CONN.
N.Y.
WIS.
MICH.
PENNA
N.J.
DEL.
MD.
ILL.
IND.
OHIO
W. VA.
VA.
KY.
MO.
TENN.
N.C.
S.C.
GA.
MISS.
ALA.
LA.
FLA.
Gulf of Mexico
Atlantic Ocean
1. Log-Header—Lombard. 2. Telegraph—Morse. 3. Sewing machine—Howe. 4. Friction match—Phillips. 5. Kodak—Eastman. 6. Safety pin—Hunt. 7. Lead pencil—Dixon. 8. Telephone—Bell. 9. Textile mill—Slater. 10. Rubber vulcanizing—Goodyear. 11. Typewriter—Thurber. 12. Rotary press—Hoe. 13. Automobile—Selden. 14. Steamboat—Fulton. 15. Thresher—Westinghouse—Wemple. 16. Circular saw—Cummings. 17. Incandescent lamps, Motion pictures, Phonograph—Edison. 18. Visible typewriter—Underwood. 19. Lightning rod, Bifocal-glasses—Franklin. 20. Elevator—Otis. 21. Airbrakes—Westinghouse. 22. Iconoscope—Farnsworth. 23. Power loom—Lowell. 24. Radio—De Forest. 25. Pennsylvania rifle. 26. Power drill—Couch. 27. Steamboat—Fitch. 28. Steamboat—Rumsey. 29. Metal pen—Williamson. 30. Automobile—Ford. 31. Cash register—Ritty. 32. Reaper — McCormick. 33. Airplane—Wright Bros. 34. Typewriter—Sholes. 35. Cornbinder—Peck. 36. Chilled plow—Oliver. 37. Machine gun—Gatling. 38. Blast Furnace—Kelly. 39. Cotton picker—Rust Bros. 40. Cotton fabric roads. 41. Cottonseed oil. 42. Peanut products—Carver. 43. Paper from Southern Pine—Herty. 44. Acetylene—Willson. 45. Cotton gin—Whitney.

Inventions Are on the March

AN INVENTION that is widely used may change the lives of millions of people. It affects industry, labor, education, the family, and perhaps health. To use a simple example —the use of the tractor has altered the whole manner of farming. It reduced the need for animals, hence the need for growing fodder for them. That changed the planting of the fields, leaving more room for "cash crops." The farmer then became a specialist, because, with a tractor, it was easier to plant, cultivate, and harvest only one crop. By cutting down his labor, it also enabled him to cultivate a larger farm. One-crop agriculture brought the farmer more cash but it forced him to spend more money buying things. And so on.

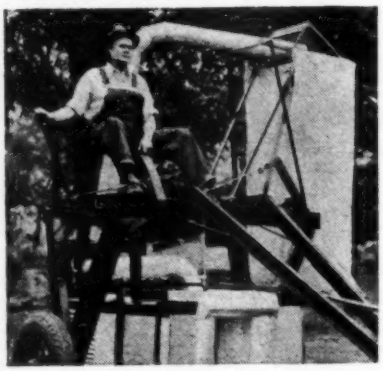
With some 44,000 patents a year to the credit of American inventors, it is important to know which may have the greatest effect upon the lives of Americans in the future. The Federal Government's National Resources Committee recently published an important book called *Technological Trends and National Policy*. In it, the Board listed the following inventions as among those most likely to be widely used in the future with significant effects upon the society we live in.

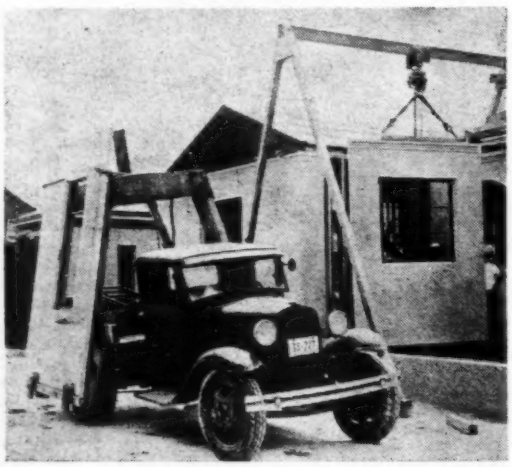
1. The Mechanical Cotton-Picker

John and Mack Rust did the back-breaking work of picking cotton in Tennessee in their youth. When they got older they joined forces to perfect a mechanical cotton picker. Now they have a workable machine which can pick as much cotton in an hour as 100 field pickers. It is not a new invention, for men have been trying to work out just such a machine for years. But the Rust machine looks as though it may ring the bell.

There are two catches to the machine at present. One is mechanical and the other is social. The mechanical difficulty is that the machine is neither a very clean nor a very discriminating picker. Its long mechanical arms and fingers will pick up trash, unripe bolls, blossoms, empty bolls and everything else in addition to the good, ripe cotton. The social problem of a successful cotton picker would involve the question of what would happen to the million and a half field workers who now make their living in the cotton fields. Also some 5,000,000 horses and mules would be thrown out of jobs, so to speak.

The Rust Brothers are aware of these problems and at present they will not sell the machine but will only rent it to planters who have entered into an agreement to protect their tenant farmers and pickers.





Above: The Rust Brothers cotton picker. Below: A section of a concrete prefabricated house being hoisted into place.

2. Tray Agriculture

Growing the family food in trays is called "hydroponics" by its inventor, Professor W. F. Gericke of the University of California. Hydroponics means simply water culture (literally "labor of water"), but tray agriculture does not depend upon water alone. To be sure, plants in the trays trail their roots into liquid instead of into earth, but they get their food from the chemicals in the trays. As a seed bed, straw, peat, rice hulls or pine shavings will do. The result has been tomato vines so high the fruits had to be plucked from a step-ladder, potatoes of fabulous size and in fabulous quantities, tobacco, and other vegetables and fruits. Where tomato patches in the Santa Clara Valley ran 12 to 20 tons per acre, Dr. Gericke would have harvested about 80 tons per acre, if he had had an acre under cultivation. "Something to knock your eye out."

But there are a few catches in this bountiful scheme. First, the chemicals in the tray must be in exactly the right quantities, and each plant requires a different set of chemicals. For example, if you plant carrot seeds in a tray that was mixed for growing potatoes, you might get very luxuriant carrot tops but no carrots. So, at present tray gardening is a job for soil chemists. It is still in the experimental stage, and it is expensive. The gardener has to know about the P-H of his plants, which means their relative alkalinity or acidity. However, the day may come, and soon too, when it will be possible to buy the chemicals already expertly mixed for growing all your food in sand or in liquid-filled trays.

3. The Prefabricated House

The American home has been invaded by applied science in the form of oil heater, automatic refrigerators, electric stoves and washing machines, air-conditioning and a score or more of mechanical devices. All this has combined to make Americans wonder if perhaps they couldn't have a home which would be in tune with the gadgets which make the family comfortable. That was the first step. The next was the discovery that the old, hand-made building run up by the carpenters and masons was a pretty expensive proposition for a man with a slim pocketbook — $6,000 to $7,000 for nothing special. Several inventors had the bright idea that house parts could be put together on an assembly line as neatly as automobile parts, and the house assembled therefrom would be a neat, modern little number costing about $3,500 or less.

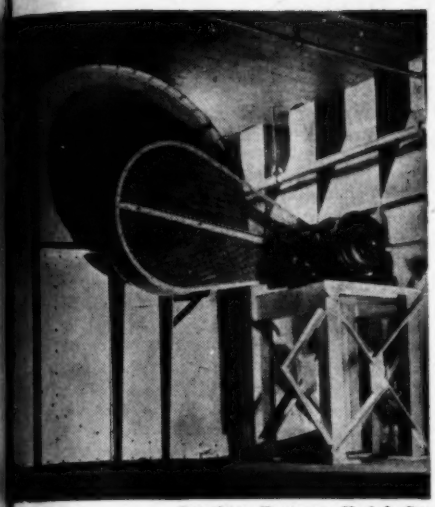
Prefabricated houses are made of various materials. Many are of steel panels or concrete blocks, combined with wood, asbestos, gypsum, wood-fibre board, ply-wood, rock wool for insulation, plastics, brick, and all other modern building materials. Almost all are planned for a very wide use of electrical appliances. The houses are fire-proof, insect-proof and well insulated against weather.

4. Air-conditioning

As the discovery of fire has made it possible for people to live in comfort during rigorous winters in the north, so will the discovery of systems of cooling make the tropics endurable. It demands a greater water supply than many communities now have, and either electricity or steam to run the cooling motor and humidifier or dehumidifier.

The air conditioner in one form or another is not new. In 1897, Joseph McCreery of Toledo, Ohio, first used the kind of air washer used today for keeping factory rooms pure and clean. It is especially desirable in rooms where the temperature must be kept even, as in bakeries, cotton or other textile mills, paper mills, etc. Air-conditioning has been used in chemical plants for several years.

In the hospitals, air-conditioning gives much greater relief and comfort



Courtesy Eastman Kodak Co.
Part of air conditioning system in an acetate yarn mill, at Kingsport, Tenn.

to the bed-ridden than it gives to the able-bodied in the home. But, it is probably only a matter of time and large-scale, standardized manufacture until air-conditioning will relieve man from most weather discomforts.

Air-conditioning works by means of a machine which sucks in outdoor air, washes it in cold water and chills it by a refrigerated coil. The cold air is then blended with warm air to the right temperature and fanned through the room.

5. Synthetic Rubber

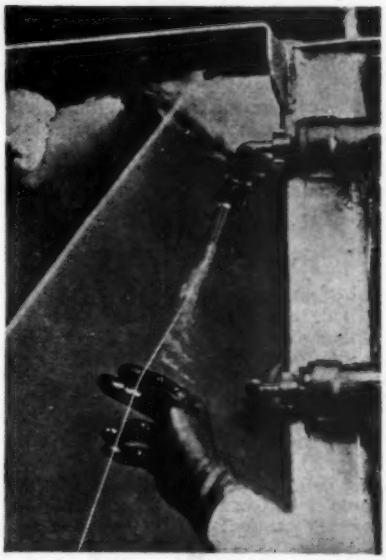
The United States now imports from the Far East, 99 percent of the enormous quantity of rubber it uses. Great Britain, through its control over the Malay Straits has almost a monopoly of the world's rubber. For years now, Americans have been seeking a satisfactory synthetic rubber which would cut down to some extent our dependence upon Far Eastern rubber. Before his death, Edison spent much time experimenting with goldenrod and sunflowers in the hope of producing from them a satisfactory rubber. But in 1931 a synthetic rubber was made by the Du Pont chemists which looked and acted like rubber but had none of rubber's weaknesses. It would not "die" in heat or go to pieces when exposed to grease, oil, gasoline or alkalies and acids. It is called neoprene, and it is produced from coal, limestone, and salt.

But, good as neoprene is, it has one big fault. At present it costs three and one half times the price of rubber. Even though it wears better than rubber, it is still too expensive to replace natural rubber. History has proved again and again that when quantity production takes place the price drops. So, if and when, neoprene actually begins to replace natural rubber, say if our country were cut off from natural rubber supplies, it may be able to match the price of natural rubber dollar for dollar.

6. Cellulose Fiber

Cellulose is probably one of the most important and interesting fields for chemical research. This compound, still something of a mystery is already used in textiles, paper and lumber, pyroxylin (a plastic) and gun cotton. But much as cellulose is now used in industry, it is still only a lusty infant. Chemists believe its destiny reaches toward the stars. It is a sort of sleight-of-hand compound. In one form it becomes paper, in another a hard, shiny plastic, in another a photograph film, in another it is Cellophane, in another a paint or lacquer, and in still another it is a fabric—rayon.

But that is by no means all that cellulose will be. Right now, it is trying to turn itself into wool and cotton. And it will, too. At present, the cellulose wool made by a German plant, called Vistra, is made in a manner similar to rayon manufacture.



Courtesy duPont Co.
Liquid viscose transformed in a chemical bath into cellulose filaments to make rayon thread at a du Pont plant.

But a much better synthetic wool is made from casein — dried skimmed milk. The Italian Company SNIA Viscosa has produced such a product called lanital. In America some 40,000,000 pounds of casein are manufactured. Two government chemists, Stephen P. Gould and Earl O. Whittier, have produced a fiber by a method like the rayon method. It is straw-colored, looks like Merino wool, and is mothproof and more or less shrink-proof. The catch, however, is that it probably will not stretch (has less tensile strength) and it can be eaten up by acid. Nevertheless, you may not be able to tell in a few years whether your overcoat came from a sheep's back or from a milk pail.

7. Gasoline From Coal

Probably there is no single substance upon which the wheels of industry are so dependent as oil. Transportation on land and sea is equally so. But the reserves of petroleum in the earth are limited. They are also unequally distributed so that some nations, like our own, have plenty—others none. In the course of a number of years — how many even the experts cannot say— some substitute must be found.

One plentiful source of synthetic gasoline is bituminous coal. From it can be obtained a mixture of benzene and small quantities of other compounds called hydrocarbons. These motor gases are made from crushed coal heated in coke ovens, washed, and distilled. About three and a half gallons of benzole are extracted from a ton of coal.

For the lubricating oils made from petroleum which are needed to keep the moving parts of motors moving smoothly and silently, certain substitutes have been found. Castor oil (yes, our old friend of the medicine chest) can be made to do duty. The "hydrogenation" of certain synthetic products will produce other lubricants. Hydrogenation means the introduction by chemistry of hydrogen atoms which completely change the nature of the compound. Even the natural petroleum supplies which we still have can be vastly increased by hydrogenation, so that 105 barrels of gasoline can be produced from 100 barrels of petroleum.

8. Plastics

Perhaps your grandfather wore a celluloid collar, but if he did he had to be careful never to get his lighted pipe too near it. Celluloid was the first plastic ever invented. That was the trouble with the first plastic. It had a fiery temper, for it was made of gun-cotton and camphor. Since 1847 there have

Courtesy duPont Co.
Heavy rollers remove the lumps in pyralin, one of du Pont Co.'s new plastics.

Juan de la Cierva flew the English Channel in 1928 in his autogiro, carrying a passenger, M. Bouche, shown in picture.

been many new plastics on the market. Strictly speaking, a plastic is a synthetic material which is made by hardening some sort of soft or pliable material, produced by chemistry. One of the most important of these hard materials is bakelite, invented in 1907 by Baekeland, a Belgian chemist. Bakelite is a "synthetic resin" made by heating together carbolic acid and formaldehyde, and adding caustic soda, which helps the two substances to unite and form a thick, resinous substance. This is mixed with oil and fine-ground wood and subjected to molding by great hydraulic pressure. The result is the hard, shiny black substance used for electric-iron handles, electric apparatus and hundreds of other objects.

Other important plastics are casein, made from milk, pyralin, beetleware, celluloid, plaskon, cellulose acetate, and tenite. Perhaps one of the greatest future uses of plastics may be as a coating for removable steel panels for prefabricated houses.

9. Steep-Flight Aircraft

An airplane that will rise and come down in a more or less straight line is sometimes called a "steep-flight" aircraft, or autogiro. It seems an easy enough matter in theory. You simply need a vertical propeller to take the airplane off the ground to a height great enough so it is ready to go ahead by transferring the power to a forward motion. Juan de la Cierva in 1920 solved the problem to some extent by the freely moving blades attached to a vertical axis in the autogiro. The autogiro will rise in about twelve yards, instead of the two or three hundred needed for an airplane. It comes down slowly and settles on the ground, instead of gliding as the airplane does.

The autogiro has reached a speed of about 120 miles per hour, but it is far slower than an airplane, and it will not carry any great load. These are the two present objections to it, and extensive developments, perhaps utilizing some other principle, are necessary before it can become a universal convenience. The great advantage is that an autogiro is the most suitable aircraft for private use. It can take off from and land on a roof or a tennis court. It is smaller, slower, safer and less difficult to manage than an airplane.

10. The Photoelectric Cell

The photoelectric cell and the radio tube are first cousins. The cell looks like a tube, except that there is a small slit through which light can enter. The idea is that electrons are released or emitted from certain alloys when light falls upon them. The electric current set up in this way is very tiny indeed, but the vibrations of the cells can be amplified enormously so these minute inter-actions of light, alloys, and electrons can be made to do almost any task with ease, and uncanny intelligence.

We all know something about doors which swing open as we walk toward them, of the magic-seeming "scanning eye" which helps to send pictures by wire and radio and television, of automatic traffic lights which change as a car approaches, of automatic counters which record the number of parcels which go down a chute, of smoke-detectors and many other remarkable inventions which seem to do everything but talk. They are all operated by photoelectric cells.

All these things work by breaking a light beam in front of a photo-electric cell. When the beam is broken, some sort of machine is set in motion, to carry out the task that is needed. For example as you approach an automatic door, your body intercepts the beam and a device swings the door open.

11. Television

At long last it looks as though television were going to come around that corner whence it has been sending out signals every once in a while for the past couple of years. The Radio Manufacturers' Association decided recently "to bring television into the open and crystallize it as an industry that promises to give employment to many thousands. We . . . are convinced that experimental research has reached a point where a practical image receiver can be offered to the public. . . ."

RCA and several other manufacturers have put their engineers to work designing instruments which will offer pictures measuring 7 by 9 inches. Some of the models will pick up only pictures and others will present both sight and sound. NBC will offer broadcasts from the Empire State building and Columbia from the Chrysler building, both in New York. They will both begin with a limited program service to the public over a radius of perhaps fifty miles. Later probably Philadelphia, Boston, Pittsburgh, Albany, Chicago, and Los Angeles will all have their own telecasting stations. So far all telecasts travel by ultra-short waves, which will give dependable service only a few miles in all directions.

Television is an extremely complicated process. It depends largely upon the photoelectric cell, which makes possible the scanning of the pictures taken by the special television camera. It also depends upon ultra-short radio waves which will carry millions of electrical impulses a minute. (That many are needed to show motion.) Ultra-short waves will travel only a few miles, so the next technical problem to be solved is to find a system of relaying telecasts so they will travel great distances.

The social problems which television as an industry raises are as knotty

(Concluded on page 35)

This picture shows you how N.B.C.'s experimental television is being received in the homes of a group of engineers. The set is about the size of a console radio.

THE MARCH OF EVENTS

SCHOLASTIC'S WEEKLY REVIEW OF NATIONAL AND WORLD NEWS

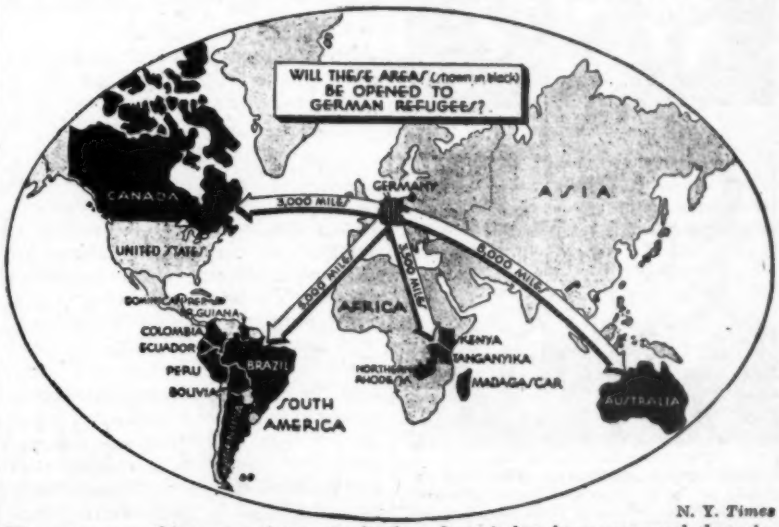
Britain May Settle Refugees From Nazi Terror in Colonies

World-wide condemnation of Nazi Germany's ruthless persecutions of Jews and Catholics was followed last week by definite steps to provide refuge for these thousands of homeless people. (*Schol.*, Dec. 3, p. 13-S.)

British Prime Minister Chamberlain told Parliament that refugees would be settled in Tanganyika, formerly a German colony, and in the uplands of British Guiana, in South America. He added that there were good prospects of smaller colonization schemes in fertile Nyasaland, Northern Rhodesia, and Kenya, British African colonies. The Netherlands, long a refuge of oppressed peoples, allowed many refugee children to enter. It was, however, proceeding cautiously since the nation could not take care of the many thousands who might come for safety. America's strict immigration law, however, limits the number of refugees that can be admitted at present. Under this law a "quota" of about 28,000 immigrants is allowed from Germany and Austria. This "quota" has been filled for 14 months, and there is opposition to Congress' amending the law so that more refugees can enter. Some critics agree that unfortunates should be aided, but insist that the United States should not admit more immigrants while it is troubled with millions of unemployed. Others insisted, however, that many of the refugees were of a high type that would benefit the nation, and in the present emergency the United States should put humane considerations first.

As was expected, the British plan to settle Jews in a former German colony was denounced bitterly by Nazi newspapers. Jews praised Chamberlain, but feared that anger over Tanganika might cause the Nazis to make it more difficult for Jewish refugees to leave the country. Following up the campaign of terror that began after a German Embassy official in Paris was killed by a youthful Jewish exile, the Nazis levied a 20 per cent tax on all Jewish holdings over $2,000. The tax decree also provided that insurance claims on property damaged by the Nazi riots must be turned over as part of the $400,000,000 "fine" for the murder of von Rath in Paris. Nazi official publications forecast the driving of remaining Jews into "ghettos" and foresaw their "extermination by fire and sword" if necessary, unless they left Germany. Hitler's right-hand man, Field Marshal Goering, issued orders later that all attacks on Jewish property should cease. This was an indication that world-wide boycots against Germany products were having their effect. German-American relations were strained by the re-call for "reports" of ambassadors of both nations and the ambassador of Colombia has been recalled because of an insult by Nazis during the anti-Jewish riots. In America, Newspaper Columnist Dorothy Thompson's appeal for funds to aid the defense of the Jewish youth on trial for von Rath's murder was answered by thousands of contributions.

Unable to leave Germany with but a small amount of property, if any, and barred from other nations if they have no means of support, German exiles face a black future unless other countries raise money to aid them. Last summer the Evian conference, called by President Roosevelt, considered schemes for aiding refugees. A permanent committee was established in London. It then began hunting some region where refugees could settle, seeking funds to move them, and permission for them to leave Germany with at least part of their property. The movement of Jews to Palestine has been aided by plans whereby their wealth was converted into German products, which could then be taken to the Holy Land. This exchange system was being studied by the Committee when the latest outbreak of Nazi terrorism increased the refugee burden to such an extent that the London organization could not handle it alone.



N. Y. *Times*

The arrows on this map point to territories where it has been proposed that victims of Nazi persecution seek refuge. All are remote from the German homeland.

The present scheme provides for the resettlement of refugees in British colonies with the aid of funds donated by private citizens and the Government. Refuge for some may be found in the Netherlands East Indies and in the United States, if we agree to change our immigration "quota."

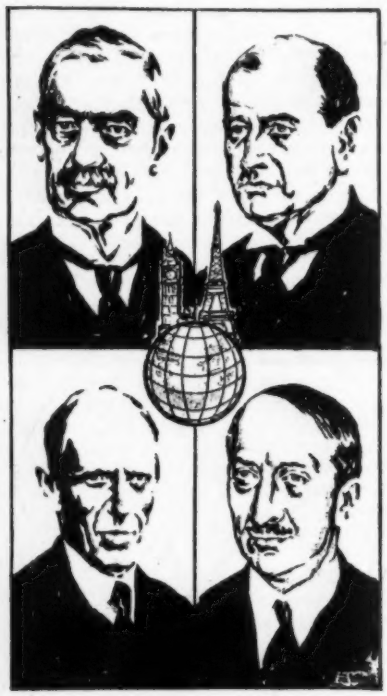
If German Jewish refugees are settled in Tanganyika and British Guiana they will face the problem of living in jungle lands—rich in resources, but thinly populated and

(Concluded on page 28-S)

Europe's Search For Peace Confused by French Strife

British-French efforts to preserve peace in Europe by reaching an understanding with Germany and Italy are traveling a very rocky road. France's position has been weakened further by a new outbreak of strikes against Premier Daladier's drastic economy-taxation policies.

Prime Minister Chamberlain's program to pacify Hitler has been upset by the savage Nazi drive against Jews and Catholics. Thus, the



British-French statesman who met recently in Paris. Top row: Prime Minister Chamberlain, Premier Daladier. Bottom row: Foreign Ministers Lord Halifax, Britain, and Bonnet, France.

recent meeting in Paris between Chamberlain, British Foreign Minister Lord Halifax, and French Premier Daladier and Foreign Minister Georges Bonnet side-tracked the idea of "purchasing peace" from Hitler by returning some of Germany's lost colonies. Instead, the British-French statesmen spent five hours planning an increase in armaments. Even France's announced plan to sign a "no-war" agreement with her old enemy Germany did not halt British-French defense preparations. They agreed that the Franco-German agreement was important, but said that future peace can best be assured by a strong national defense. Both Britain and France realize that Germany's air force and army are two of the big reasons why Hitler got all he asked from the Four-Power parley at Munich last September. In view of this, they are preparing for the next crisis now. Discussing the attitude of both nations toward the Franco-German peace agreement, Anne O'Hare McCormick of the N. Y. *Times* writes: "A year ago . . . an announcement that Germany and France had agreed to avoid future war . . . would have been hailed as the most sensational news since the end of the World War. . . . Today that extraordinary declaration is only another item in the day's news. . . . Nor does an anti-war pact with Germany cheer France. . . . After the Munich agreement . . . the joyous French welcomed Daladier with acclaim. . . . After this pledge Daladier is the target of fiercer opposition than at any time since he took office. . ."

The French Crisis

Back of the increasing opposition to Premier Daladier are several factors. Socialists, Communists, and some members of the Premier's own Radical Socialist party, charge that Daladier's attempts to reach an understanding with Italy and Germany will force France to take a "back seat" in European affairs. In addition, the Premier's drastic three-year program to "restore confidence is denounced as an attack on the reform and labor welfare laws that were passed when the Popular Front gained power in 1936. Former Socialist Premier Leon Blum, and other leaders, agree that sacrifices are needed to revive French business and speed up her armament industries. But they insist that the Premier's program calls for sacrifices mainly from labor and the poor classes. Joining the opposition, the powerful French General Confederation of Labor called a one-day general strike to protest Daladier's increase of taxes on gasoline, sugar, wine and tobacco, and his abandonment of the 40-hour week law. Harassed from all sides, the Premier ordered troops to smash sit down strikes in several plants, and even threatened to outlaw the Socialist and Communist parties. He has ignored Socialist demands that he resign, and is ready to mobilize troops to keep French factories running. Daladier's threats of drastic action brought renewed fears that France will become a dictatorship. French war veterans are demanding a "strong government" to meet the present crisis firmly. Rumors say that Daladier or one of his close advisors may, with the backing of conservative parties and French businessmen, set up a new Government and rule for several years without the aid of Parliament. The sidetracking of Parliament, which is elected by the people, would be the first step toward replacing France's present Democratic system by a "strong arm" dictatorship.

Poland Warned to Halt Invasion of Ruthenia

European "danger spots" continued last week to cause anxiety. Germany and Italy, backed by France and Britain, bluntly warned Poland not to invade Ruthenia, a self-gov-

Map shows position of Ruthenia in relation to Poland and Hungary, both of whom are seeking a common frontier.

erning Province of Czechoslovakia. Reports of fighting on the Czechslovak border led to rumors that Poland and Hungary would attempt to occupy Ruthenia.

Germany and Italy followed up the Munich partition of Czechoslovakia by giving Hungary some ter-

(Concluded on page 28-S)

Monopoly Committee to Study Methods of Big Corporations

A committee with a big name—the Congressional - Executive Monopoly Investigating Committee—has begun the big job of finding out what makes the "wheels go 'round" in American industry. It also wants to know why "industry's wheels" clog and throw millions of people out of work. Senator O'Mahoney of Wyoming, chairman of the Committee, has assured business that no New Deal attack on industry is planned. The purpose of this inquiry is to discover ways of freeing business from the handicap imposed by those who gain a monopoly on certain products and then hamper trade by charging high prices.

Congress has voted $500,000 to finance the twelve-man Committee. In calling for this action, President Roosevelt said that the 200 largest corporations now control more than 50 per cent of the business wealth of all corporations. This power, he insisted, was so great that it must be regulated in the interests of the people. In this connection, the Monopoly Committee must answer some important questions.

Have certain industries caused unemployment by raising prices and limiting the amount that the average consumer can buy? Are big corporations all "bad?" Do they charge too much for products and give the public poor service? Experts say that some big businesses are more efficient, and can make products more cheaply than small firms, and that the effort to help the small business enterprise at the expense of the large one is also often injurious to the public.

Assistant Attorney General Thurman Arnold, who heads the government's new drive against monopolies, says that illegal business combinations, both big and little, will be attacked by Federal officials. At present, his Department has a record-breaking number of cases on hand. Court actions against the Ford and Chrysler Motor Companies were dropped recently when these companies agreed to change their methods. Independent finance companies, who help people buy automobiles on credit, had complained that Ford and Chrysler were driving them out of business. A similar case against General Motors has not been settled yet. Hollywood became aware of the Government's anti - monopoly crusade when action was taken against motion picture producers and distributors, accused of trying to control the admission prices and policies of theatres throughout the nation. In

ARNOLD

O'MAHONEY

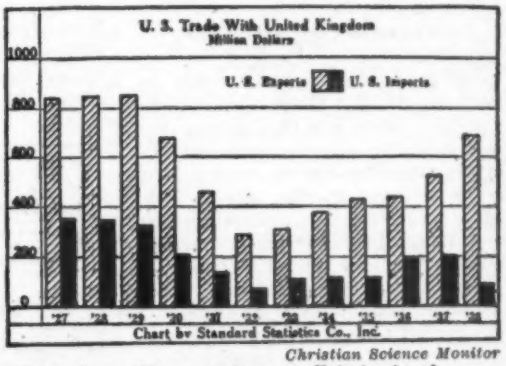
all its anti-monopoly cases the Government is using the "consent decree" method employed with Ford and Chrysler. That is, if the companies consent to halt illegal practices, the Government will stop its suit against them. In this way the Government hopes to police business without punishing business men needlessly.

British-American Trade Pact Considered Spur to Business

On January 1, the recently signed United States reciprocal trade agreements with Great Britain and Canada will become effective. (*Schol.*, Dec. 3, p. 15-S.) Closer examination of these pacts reveals that no tremendous increase in trade will be brought about. But these treaties are considered a step in the right direction, and are a sample of democratic cooperation in the face of Nazi and Fascist aggression.

Approximately $703,000,000 in annual trade between America and Canada and Britain is directly effected by these treaties. American wheat, corn and fruit growers gained under the British pact. Our "corn belt" states were favored by the lowering of British tariff taxes on lard, hams and other pork products. Britain gained lower rates on liquor, textiles and manufactured metal goods. British newspapers hailed the pact as "a women's trade agreement" because British women will be able to buy American shoes, handbags, lipsticks, refrigerators, canned fruit and electric carpet sweepers more cheaply. In particular, Mrs. John Bull was pleased since American silk stockings, now costing 60 cents a pair or more, will cost less when the tariff cut takes place.

New England textile mills opposed the British agreement, and other industries said a "flood" of cheap Canadian and British products would hurt them. Experts were inclined to feel that even if a few industries were injured the whole nation of consumers would gain by a lowering of the cost of living.



Christian Science Monitor

Although tariff concessions to Britain in the new trade agreement have aroused American opposition, this chart shows that we annually sell much more to Britain than she exports to the United States.

"Incentive" Taxation Plan Disputed as Recovery Aid

"Incentive" tax exemption—what is it? Will it help solve the unemployment problem? This term and these questions now are being studied by a subcommittee of the United States Senate, and its findings will be presented to Congress after January.

To explain: About 50 companies seek better relations with their employees by profit-sharing plans that give workers a share in the company's business. Should the Federal government give incentive (encouragement) to such plans by granting tax exemption (a lowering of taxes) to companies that share profits with their workers? At present, the Government raises money by taxing the incomes and profits of companies. Republican Senator Vandenberg of Michigan believes that "incentive taxation" would encourage the expansion of business, and increase the incomes of workers. Of course, less tax money would be collected, but the Government might need less if business were to expand and employ more men. The Michigan Senator is a member of the subcommittee.

headed by Senator Herring, Iowa Democrat, which is examining profit-sharing systems.

Labor union officials opposed the plan saying that higher wages were the kind of "profit-sharing" they preferred. A spokesman of the National Association of Manufacturers, representing employers, also flatly opposed the "incentive tax" plan. This "hard boiled" attitude surprised Senator Vandenberg, who said he now wondered whether the N.A.M. really spoke for a majority of businesses.

States Vary in Attitudes Toward Labor Restrictions

Besides electing Congressmen and Governors on November 8, many States voted on subjects ranging from anti-labor laws to restrictions on hasty weddings.

New York approved a Constitutional amendment guaranteeing labor's rights, but Oregon voters approved a labor law that unions fear will cripple their activities. It regulates picketing during strikes, and seeks to prevent labor unions from building reserve funds for use in case of a strike. In California and Washington, however, similar anti-labor proposals were rejected by voters. These anti-labor laws were the outgrowth of CIO-A.F. of L. disputes, which tied up business on several occasions, and played into the hands of anti-labor forces who wanted an excuse to smash Coast unions.

California's famed "Ham and Eggs" pension plan to pay 30 scrip dollars every Thursday to all persons over 50 was voted down, but North Dakota raised its pension payment from $30 to $40 monthly, and Colorado voters refused to repeal that State's liberal old-age pension of $45 monthly although the Treasury is about empty.

Maryland joined other States in abolishing hasty weddings by approving a law requiring a two day waiting period after an application for a marriage license.

The merit system of civil service, which selects government job holders on their ability rather than their political pull, was adopted by eight cities and one county, including Detroit, Cleveland and Portland, Oregon.

Shoemaker in the Chicago *News*

It's Good to Carry a Full Line

GOVERNORS ELECTED

Alabama	Frank M. Dixon D.	Nevada	E. P. Carville D.
Arizona	R. T. Jones D.	N. Hampshire	*F. P. Murphy* R.
Arkansas	*Carl E. Bailey* D.	New Mexico	John E. Miles D.
California	Culbert T. Olson D.*	New York	*Herbert H. Lehman* D.
Colorado	Ralph L. Carr R.*	North Dakota	John Moses D.*
Connecticut	R. E. Baldwin R.*	Ohio	John Bricker R.*
Georgia	*E. D. Rivers* D.	Oklahoma	Leon C. Phillips D.
Idaho	C. A. Bottolfsen R.*	Oregon	Charles A. Sprague R.
Iowa	George R. Wilson R.*	Pennsylvania	Arthur H. James R.*
Kansas	Payne H. Ratner R.*	Rhode Island	Wm. H. Vanderbilt R.*
Maine	*Lewis O. Barrows* R.†	South Carolina	Burnet R. Maybank D.
Maryland	H. R. O'Conor D.*	South Dakota	Harlan J. Bushfield R.
Massachusetts	L. Saltonstall R.*	Tennessee	Prentice Cooper D.
Michigan	F. D. Fitzgerald R.*	Texas	W. Lee O'Daniel D.
Minnesota	Harold Stassen R.*	Vermont	*George D. Aiken* R.
Nebraska	*Ray L. Cochran* D.	Wisconsin	Julius P. Heil R.*
	Wyoming Nels H. Smith R.*		

Italicized names indicate re-election. *Replaced incumbent of opposing party. †Re-elected September 12, 1938.

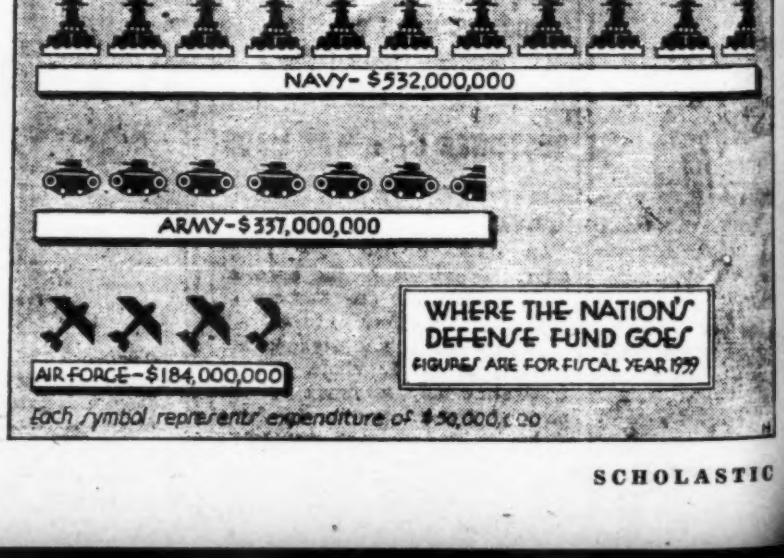
Seven Peace Organizations Oppose U. S. Arms Increases

While President Roosevelt talked of defending the New World from Fascist aggression, and army and navy officials speeded plans last week to put America in the world-wide armament race, seven national peace groups made the first organized attack on the new defense program.

These organizations compared the President's program with Orson Welles' radio "invasion" of the world which scared listeners recently (*Schol.*, Nov. 19, p. 15-S), and added that Mr. Roosevelt's "show was decidedly more dangerous." Instead of spending more billions of defense, they argued, the United States could fight fascism better by proving to Latin American nations that American democracy can solve its problems of unemployment and poverty. (*Schol.*, Nov. 5, Behind the Headlines.) Organizations making the protest were: the National Council for the Prevention of War, the Women's International League for Peace and Freedom, the Keep America Out of War Committee, World Peaceways, the Fellowship of Reconciliation, the Youth Committee Against War, and Labor Anti-War Council.

In a recent book Major George F. Eliot, military expert, says that the U. S. needs a military and navy force able to defend Canada and South America against the combined attacks of Germany, Italy and Japan. But he believes this need does not demand an enormous expansion of the army and navy, or a Government dictatorship over labor and industry in war-time. Despite these protests, the navy is building three new 35,000 ton battleships and says it must speed work on other vessels.

N. Y. *Times*


NAVY- $532,000,000
ARMY- $337,000,000
AIR FORCE- $184,000,000
WHERE THE NATION'S DEFENSE FUND GOES
FIGURES ARE FOR FISCAL YEAR 1939
Each symbol represents expenditure of $50,000,000

Lightning in the Laboratory

A Radio Drama Based on the Life of Charles Proteus Steinmetz

By Lewis W. Moyer

This radio play on the life of the eminent genius of electrical research, Charles P. Steinmetz, is a condensation made by the editors of *Scholastic* of the original half-hour broadcasting script prepared for the *Pioneers of Science* series of the Works Progress Administration's Federal Theatre, Radio Division. It is reprinted here by special permission of the Federal Theatre, Radio Division,

Keystone

Charles P. Steinmetz

and no performance, public reading, or radio presentation may be given except by special arrangement with the Federal Theatre Project, 1697 Broadway, New York, N. Y.

The *Pioneers of Science* series was originally heard over WHN and the Empire State Network and was later broadcast by WNYC and piped into the Inter-City Chain, an eastern seaboard network. The Federal Theatre Radio Division is at present broadcasting over the Columbia network on Saturdays at 9 P. M. a series of radio dramas based on Paul de Kruif's books (see page 24-E). The Federal Theatre's series based on James Truslow Adams' *Epic of America*, broadcast last spring over WOR and the Mutual Network, was awarded the Women's National Radio Committee's designation as the second best radio series "of educational value to children" and was so well received that it was later recorded and broadcast over WNYC as a special program for school classes.

ANNOUNCER: The Federal Theatre is on the air! Presenting:—"Pioneers of Science," a portrayal of the lives and achievements of men and women famous in the world of science.

(One long steamer whistle. Fade in at once—river noises, ship's whistles.)

NARRATOR: June 1st, 1889! The French immigrant steamer *La Champagne* slowly noses into lower New York Bay. On the main deck, the steerage passengers swarm forward to gaze fascinatedly at the Statue of Liberty!

(Voices babbling in many languages.)

ASMUSSEN: It is the new world, Karl. The land of promise.

KARL: Jah. Listen to them, how hopeful they all sound. French, German, Jewish, Russian, Armenian—*(coughs a little)*.

ASMUSSEN: But soon it will not be French, or German or Russian—it will all be American.

KARL *(has a coughing spell)*: I am sorry, Asmussen. This *(coughs)* cold I have is not so good.

ASMUSSEN: I can see that you still do not feel better. You really do look pretty awful! Hardly human.

KARL *(bitterly)*: *But I never do!*

ASMUSSEN: Come, Karl, you shouldn't talk so! I did not mean it that way! Cheer up! Why, in half an hour we'll be in New York City! Then we go through the customs and—

KARL: You mean we go right through, right away—

AMUSSEN: Immediately, Karl! Have you everything ready?

KARL: Jah! I am ready!

(Babble of excited voices in large, hollow sounding room. Luggage trucks, trucks being loaded, etc.)

ED: Step lively there! . . . Step along! . . . You there! . . . You're next!

KARL: Jah, mein herr!

ED: Your name please?

KARL: Charles Proteus Steinmetz, mein herr.

ED: Profession?

KARL: Mathematiker und Froscher.

ED: Speak English if you can!

KARL: Excuse, I am mathematician und engineer.

ED: That's better. Have you any money? *(pause)* Come! Speak up man!

KARL *(mumbles)*: Nein, mein herr!

ED: Hmmmmm! No money, eh? Speak English? No I guess not! Any job?

KARL: Chobb? Vus iss chobb?

ED *(exasperated)*: Job! Position! Employment, you dumbbell! It means work!

KARL: Work? . . . Nein!

ED: Thought so. . . . Well stop aside there a minute! *(aside)* Mike! Hello Mike!

MIKE: Yea! Want me, Ed?

ED: Come here a minute, will ya?

MIKE: Comin' right over Ed! What is it this time?

ED: Take a look at this one!

MIKE: A hunch-back, eh! Looks as if he had some bad kind of illness.

ED: Yeah, don't he?

MIKE: Can't be over four feet three! Gosh! I don't see how any one can get by lookin' like that, Ed! He's the ugliest lookin' dwarf I've ever seen!

ED: Ain't he though? No job! No money! No English! Besides that, he's deformed and evidently sick!

MIKE: Well. . . . There's nothing we can do there! Put him in with the next batch to be shipped back where they came from.

ED: That's what I thought, Mike! Alright, you over there under that sign! Detention pen for you!

KARL: Detention pen, mein herr? I do not understand?

ED: Sorry! You heard me! To the detention pen! Move along with you! . . . all right, Miss, you're next. . . .

ASMUSSEN *(coming on)*: Just a moment sir! I'm afraid there's been a mistake!

MIKE: Mistake? Who are you, Buddy?

ASMUSSEN: My name is Asmussen, as you may see from my passport!

MIKE: Go on.

ASMUSSEN: I just overheard you sending my friend, Karl Steinmetz, to the detention pen! I'm afraid that's partly my fault!

MIKE: Sorry, that's a sad case! The poor guy just can't come in, that's all!

ASMUSSEN: But why? He is a famous scientist! He has money, and friends!

MIKE: So he's a famous scientist, is he? Hmmm! But he told us himself he had no money and no job!

ASMUSSEN: But that is my fault! You see, sir, I offered to take care of his money for him! I thought it would be safer! Here see for yourself! He has plenty!

MIKE: Well . . . I guess that puts a different light on the matter! But it still doesn't get him a job! Besides he can't speak a word of English.

ASMUSSEN: But he will get a job! He has friends! He has reputation! I, *myself*, will be responsible!

MIKE: Well . . . I guess . . .

ASMUSSEN: You see. . . . There is no reason why he should be . . . detained! Is there, now? He *is* deformed. . . . God made him that way . . . but it should not keep him out of a country, that stands for fairness and freedom!

MIKE: You say you will be responsible for him?

ASMUSSEN: Gladly! Gladly!

MIKE: Well . . . all right then, he can pass! *(aside)* Come on now, step lively there. . . .

(Fade on babble of voices—whistle toots, etc.)

ANNOUNCER: Strange faces; a foreign language; canyon-like streets; magnificent new bridges; everything about this new country intensified the young immigrant's desire to become a part of it. The first step in this direction was a "chobb"! He had a letter to the head of the Edison factory, but upon presenting it, they took one look at him

and turned him down! The next morning found him in Yonkers, in the office of Rudolf Eichemeyer!

(Factory noises—door opens.)

EICHEMEYER: Good morning! You wished to see me?

KARL *(in broken and stilted English)*: I am addressing Herr Rudolf Eichemeyer?

EICHEMEYER: Sprechen sie Deutsch, bitte! Speak German, please!

KARL: Deutsch? Oh, thank you mein herr, thank you! It is good to hear that tongue again!

EICHEMEYER: You are but newly come to America, perhaps?

KARL: Jah, mein herr! But a week ago!

EICHEMEYER: You were sent to me?

KARL: But I forgot! Here . . . it is a letter I have for you Herr Eichemeyer! It will say why I am here, and introduce me, perhaps!

EICHEMEYER: Good. Hmmm! You are highly recommended, Herr Steinmetz! Tell me more or your flight from Germany!

KARL *(insinuating)*: As you know, Herr Eichemeyer, Bismarck is all powerful in the Fatherland! I had the misfortune to disagree with him, politically!

EICHEMEYER: And now . . . you would like to work for me, perhaps?

KARL *(humbly)*: That is why I am here, mein herr. . . .

EICHEMEYER: For one of your electrical and engineering talents, herr Steinmetz, there is always room! How soon would you like to go to work?

KARL: At once, mein herr! At once!

ANNOUNCER: A draughtsman at twelve dollars a week! That was Steinmetz's first job! Soon his famous "Law of Hysteresis," the theory upon which the alternating current is based, was to make his name a byword, wherever engineers gathered! General Electric, a new firm, recognizing his unusual talents made him head of their calculating department, only to see it go, gradually, from bad to worse! The officials were in a quandary. . . .

RICE: I can't understand it, Lord.

LORD: There's no doubt about the seriousness of the situation, Rice. Something must be done. . . .

RICE: But some of the work in Steinmetz's department is almost miraculous. . . .

LORD: . . . and a whole lot of work isn't done at all! A great many simple problems, but none the less important, lie around for months. Those problems touch the very life of our growing factories, Rice!

RICE: I know, I know . . . but don't forget, Lord, Steinmetz has given us the solution to things that have stumped all the engineers in the country!

LORD: Oh I realize that he is the most valuable man we have. . . . But the fact remains. . . .

RICE: Something has to be done at once . . . but we can't afford to offend him!

LORD: That's the catch to it, Rice, he's so damned sensitive and temperamental.

RICE *(seriously)*: He's the only living man that completely understands that *symbolic method* of his! That has given us a decided advantage over any competition!

LORD: The only thing I can see . . . Rice, suppose we take a run down there? I'd hate like the devil. . . .

(Door opens . . . loud voices raised in argument—ad lib.)

RICE: Looks like we walked into something!

LORD: I'll say it does. . . .

TOM *(offcoming on)*: Don't be a fool, Eric!

ERIC: A fool, is it? Huh! Can *you* say differently, Tom Squires?

TOM: No but. . . .

ERIC: *Then why* argue?

DICK *(interrupting)*: There's no use making fools of ourselves, fellows. . . .

TOM *(sarcasm)*: So the great Dick Miller can give us the answer, perhaps?

LORD: Pardon me, gentelemen. . . .

TOM *(aside—sotto)*: Oh, oh, the big boss!

LORD: What seems to be the trouble?

DICK: Well you see Mr. Lord. . . .

TOM: It's a problem we've been trying to work out, sir.

ERIC: We've all had a crack at it, Mr. Lord, and we can't agree either on the answer or the method to obtain it!

RICE: So we gathered as we came in, Eric.

LORD: Just what is this grave and serious problem, Eric?

ERIC: Well the specifications for a new machine call for a hole two inches in diameter to be bored in a steel rod also two inches in diameter. The question is how much steel is removed when the hole is bored!

RICE: But why is that such a serious problem?

DICK *(quickly)*: It is a question of strength, M. Ricer! Only so much steel can be removed from the rod without weakening it! Even a thousandth of an inch makes a world of difference in a case like that!

RICE: I see. . . .

TOM: Ah, what's the use? Let's ask the "supreme court"!

LORD: "The supreme court?"

ERIC *(laughs)*: That's our nickname for Dr. Steinmetz! Any time there's anything that sticks us we can always get our answer from him!

LORD: He's the only one in this room who doesn't seem to be aware that there's an argument going on. . . .

DICK *(laughs)*: Nothing ever bothers him, sir! I doubt if he even knows we are here!

ERIC *(calling)*: Dr. Steinmetz! *(pause)—(gently and with deference)* Dr. Steinmetz!

STEINMETZ *(startled)*: Oh, Eric, excuse me I'm busy just now!

ERIC *(coughs)*: Hem! Hem! *(whisper)* Visitors!

STEINMETZ: Ah! Good afternoon, gentlemen. It is an honor to have you visit my department, Mr. Lord, and you Mr. Rice!

RICE & LORD: No, no, don't get up, Steinmetz. . . . We were going by and thought we'd drop in.

LORD: There's something we'd like to talk to you about, Dr. Steinmetz!

STEINMETZ: Of course, of course! Just one moment while I see what it is Eric wants. . . .

LORD: Go right ahead. . . .

STEINMETZ: Now Eric?

ERIC: We're stuck again, Chief!

STEINMETZ *(kindly)*: What is it this time?

ERIC: If you bore a hole two inches in diameter through a rod, also two inches in diameter, how much material is removed?

STEINMETZ *(mumbles to himself)*: A

International

When wizard meets wizard. Thomas A. Edison shown examining Steinmetz's apparatus for hurling man-made lightning bolts, one of his most sensational achievements.

hole two inches . . . through a rod two inches. . . . Two times two . . . Squared . . . cube root. . . .

LORD *(aside to Rice)*: What do you make of that?

RICE: I'll bet my last dollar he's doing the whole thing in his head!

LORD: I'll be doggoned!

RICE: How can you expect to haul a man like that on the carpet?

LORD: I give up!

STEINMETZ: Your answer is . . . five and thirty-three hundredths cubic inches, Eric! Is that all?

ERIC: Yes, Dr. Steinmetz. . . . Thanks! The boys had just about given up. . . .

STEINMETZ: Now Mr. Lord! We can go ahead. What is it you would like to see me about?

LORD *(in confusion)*: Oh! Let me see. . . . Why I've completely forgotten, Dr. Steinmetz!

RICE *(quickly)*: It was nothing important, Dr. Steinmetz! We just wanted to congratulate you on the way your department has been handled!

LORD: Yes! Yes! Of course. . . .

STEINNMETZ: Well, now. . . . that is very kind of you. . . .

(Fade on Dr's. speech.)

(Door closing—feet pacing.)

LORD *(sighs with relief)*: Phew! That was close!

RICE: I never came closer to being a perfect fool in my life!

LORD: And I never felt more like *one!* Rice . . . we'll have to find some other way out of this. . . .

RICE: I've got an idea. . . . It came to me while he was performing that little miracle. . . .

LORD: Well out with it! If it solves this riddle, I'll call it another. . . .

RICE: Well. . . . You remember what his assistant said?

LORD: No. . . . What. . . .

RICE: He called him the "supreme court"!

LORD *(laughs)*: Oh that!

RICES *That's* what Steinmetz *ought to be!* "A scientific supreme court!" Let him putter around at anything he wants to. . . . The only thing he wants, is work!

LORD: There's no argument there, Rice!

RICE: Then when a problem comes up that has everybody buffaloed we'll call him in! He'll let that brain of his buzz for a minute and the problem will be solved! Nothing simpler!

LORD: By gosh! Rice, I believe you've hit it! We'll give him a laboratory, and an unlimited expense account . . . anything within reason . . . and set him up as a sort of department of last resort!

ANNOUNCER: Charles Steinmetz became an almost legendary figure. The newspapers watched his every move. Millions of gallons of ink went into the creation of a myth around this colorful figure. G. E. gloried in his fame and capitalized on it. Lightning had always been a major problem to electrical engineers. To this, Steinmetz, now well along in years, turned his attention. One day his adopted son, Joseph Hayden, received quite a shock. . . .

(High pitched whining of electrical machinery. Then blinding flash and terrific detonation . . . pause . . . running feet . . . door bursts open.)

JOE: Dad! Dad! Where are you? . . . Dad? Are you hurt?

STEINMETZ: I'm all right, Joe.

International

A demonstration with man-made lightning at the Electrical Age Exposition in Los Angeles. Steinmetz puts on a somewhat similar exhibition in this radio play.

JOE: Where are you? I can't see a thing through this smoke!

STEINMETZ: I'm over here, Joe. Over by the long work bench.

JOE: What in the world have you been doing? When I heard the explosion, I thought the whole house was wrecked!

STEINMETZ *(laughing)*: Not that bad I hope! I've been preparing a little surprise for some guests I've invited here tomorrow, Joe!

JOE: Guests? Surprise? What in the world is it all *about?* Is it some new experiment, you're working on, Dad?

STEINMETZ: No! This isn't going to be an experiment, Joe! It's going to be a demonstration! Do you know just what lightning means to engineers?

JOE: Yes. But I don't. . . .

STEINMETZ: Every time there's an electrical storm, power lines, transformers, and even generators miles away are wrecked!

JOE: I know dad! But there's nothing we can do about it!

STEINMETZ: Yet I think there is. In fact I am pretty sure. But I would like you to help me make certain arrangements for my guests when they arrive tomorrow!

JOE: Of course, dad. What do you want me to do?

(Undercurrent of voices—ad lib—people moving about a big room, etc.)

JOE: Gosh! Looks as if all G. E., the "electrical world," and the "Press" was here in a body! Look at those reporters! Like hawks sighting their prey! Oh! Oh! Here they come! You're in for it now, dad!

REPORTER: Dr. Steinmetz!

STEINMETZ: All right, gentlemen. . . . What is it you want me to tell you?

REPORTER: Just what are you intending to do, Dr. Steinmetz?

STEINMETZ: Oh, you'll *all* see in good time. . . .

REPORTER: Yes sir, but we'd like to get our copy line up. . . .

STEINMETZ *(laughs)*: Well . . . what is it I must tell you?

REPORTER: Is it an experiment? What do you intend to prove?

STEINMETZ: A demonstration, gentlemen! First let me point out to you the materials with which we are to proceed.

REPORTERS: New miracle. . . . Up to his old tricks again. . . .

REPORTER: Say! . . . Look at that table! Will you!

STEINMETZ You will all have noticed the various apparatus in the laboratory! In order to satisfy your curiosity, I'll take time to explain. . . . Permit me to call your attention to the *model village on the table!*

REPORTER: Well, I'll be doggoned!

(Ad lib—"Church, steeple, and all! . . . Houses, trees and everything complete! . . . Gee that's a trick model, ain't it?"...)

STEINMETZ: You will notice . . . the entire model is set on a copper plate! Above it you have been wondering about the maze of wires!

REPORTER: Get a load of that.

STEINMETZ: The apparatus you see about the room is all to play an important part in today's demonstration! It is designed to reproduce conditions similar to . . . and peculiar only to electrical storms. In short . . . Lightning! The victim of all this plotting . . . is our little toy village!

VOICE: Everything is ready.

STEINMETZ: Now . . . if you will all step back behind that chalk line. . . . No! No! Don't be alarmed! There really is no danger! Just step back behind that line. . . . That's it! There! I guess we are ready now . . . We throw the switch. . . . Here! Here, *you!* Get back there! Donnerwetter! Want to be singed . . . like a bacon? Is everyone ready? *(pause)* Then we throw the switch . . . so . . .

(Subdued hum of electrical machinery gradually rising in pitch and volume—terrific crash . . . pause . . . silence broken by hub-bub of voices and rush of feet . . . voices ad lib congratulations and comments.)

VOICES: The church is gone! . . . blown to bits! . . . Gee! Smell the smoke! Look—the copper plate is melted! . . . Congratulations!

(Concluded on page 24-E)

POETRY CORNER

Poetry in Wheels

Edited by Dorothy Emerson

THROUGH the dark, beacons beckon planes with beams of light. People ride down the street in automobiles. Lights on the corner flash red and green telling the people "Stop" and "Go." The people get out of their cars. They go inside to watch shadows move as a machine turns.

These things, made for convenience and comfort and entertainment, are continually changed and improved upon, and a poet using them in his work risks being put out of date in a few years. For example, an "Ode to Mr. Pinchbeck on His Newly Invented Patent Candle Snuffers," written by William Mason in the year of the Declaration of Independence, seems a ridiculous overestimation to us now.

Today, many poets use the distinctly modern environment in their work, and take the risk of being soon out of date, because they desire to close the distance that has been widening between poets and people for many years. To some of them, a train was once a miracle that deserved an ode. To those no older than the young poet, Stephen Spender, a train has always been a means for getting somewhere fast. In his poem "The Express," Spender uses the train as a symbol of mankind's getting somewhere, making progress after a declaration of idealistic principles. Slowly it begins to move, passes certain uglinesses we know around today's railroad stations, goes faster and faster into unknown places, "new eras of wild happiness," into the future, "beyond the crest of the world," so far that now we can only make out the "streamline brightness" white on the tossing hills; the hum of the train more beautiful than a bird's song or a bough of blossoms.

The Express

By Stephen Spender

After the first powerful plain manifesto,
The black statement of pistons, without more fuss
But gliding like a queen, she leaves the station.
Without bowing and with restrained unconcern
She passes the houses which humbly crowd outside
The gasworks and at last the heavy page
Of death, printed by gravestones in the cemetery.
Beyond the town there lies the open country
Where, gathering speed, she acquires mystery,
The luminous self-possession of ships on ocean.
It is now she begins to sing—at first quite low
Then loud, and at last with a jazzy madness—
The song of her whistle screaming at curves,
Of deafening tunnels, brakes, innumberable bolts.
And always light, aerial, underneath
Goes the elate metre of her wheels.

From *Men and Machines*, by Stuart Chase (Macmillan)

Steaming through metal landscape on her lines
She plunges new eras of wild happiness
Where speed throws up strange shapes, broad curves
And parallels clean like the steel of guns.
At last, further than Edinburgh or Rome,
Beyond the crest of the world, she reaches night
Where only a low streamline brightness
Of phosphorus on the tossing hills is white.
Ah, like a comet through flame she moves entranced
Wrapt in her music no bird song, no, nor bough
Breaking with honey buds, shall ever equal.

The theme of our machine age and the application of science to industry has been surprisingly little treated by the poets of America, the nation in which mechanical science has had its most characteristic growth. Among the most successful of them was the late MacKnight Black, whose untimely death a few years ago cut off a young talent of great promise. Black was less the questioner of scientific achievements than the lyric lover of machines in their sharp, polished, and shining beauty.

This quality strongly marks the following poems taken from his volume, *Machinery*.

Reciprocating Engines

By MacKnight Black

How softly, as the great wings of eagles flow through a sky,
These tons of shaped steel
Ply through motionless air, how strongly they mesh
The stillness with a peace of their own.
The birth of a star is like this, the birth of a star
Is a blooming from quietness; wheel-flight and star-flight
Are one peace of clear motion.
The bodies of men and of women, of lovers,
Stirring with atoms, perfect in breast and limb,
Are like steel-flight; they are softly in being,
As blossoms are white on a pear tree in April;
Springing from stillness, they have their peace.

Machines

By MacKnight Black

A seed of barley two earth-inches under October rain;
A laborer's heart drumming slow music for his sleep through a night;
The lava-core of the earth, fighting hard cold eating inward from fireless space;

Every hidden hot thing there is,
Lying under flesh, under soil and stone,
Every pulse that clubs stillness,
That beats on stillness,
Has a shrine now wherever a piston-rod
Darts and recoils on a sob of steam,
Wherever a white wheel
Spins.

Is death so strong a word now
That over the earth life shall not be worshipped
In the clarity of steel?

"The Express" is reprinted from *Poems*, by Stephen Spender, by permission of Random House, publishers. "Reciprocating Engines" and "Machines" are reprinted from *Machinery*, by MacKnight Black, by permission of the publishers, Liveright Publishing Corporation.

Science and Education

Wherein Applied Science Is Shown to Have a Major Place in Both English and Social Studies Classes

APPLYING science to education is a three-way process. Science can make education more effective. Education can make greater scientific achievement possible. But education's biggest job is to make science function better in the lives of the American people. This last aspect has probably been neglected most.

We all agree that scientific aids can contribute to the effectiveness of teaching and learning in our schools. Then why is there a lag in our use of these implements as compared with their use in industry? The answer is partly economic—the difficulty in getting school authorities to finance the purchase of the necessary equipment. Yet, the real responsibility lies with educators.

We must explore scientific invention and discoveries carefully in radio, motion pictures, photography, and machines for diagnosis, in order to determine the possibilities of application to educational purposes. Teachers must be aware of the values of technological aids to teaching, if their efforts to gain wider use of these devices are to bear fruit.

Professional organizations and publications are giving increasing attention to this problem. The National Council of Teachers of English has set up a committee to study the *Application of Technological Advancement to Language*. A report on one aspect of this study, namely, *Microphotography*, was made by Walter Ginsberg, of Teachers College, at the recent convention of the Council at St. Louis (see page 2-T).

Several organizations — the National Education Association, the Progressive Education Association, the Town Hall, the American Library Association, the National Council of Teachers of English, and the American Museum of Natural History—are cooperating with broadcasting companies in the preparation of educational programs for radio. The Progressive Education Association has been experimenting with the use of excerpts from feature films as an aid to the study of human relations.

There are a number of publications that will acquaint the educator with newest developments in radio and screen: Ohio State University's *The News Letter* (free) and *The Ohio Radio Announcer*, the H. W. Wilson Company's *Educational Film Catalog* (New York) and its quarterly supplements, *Education by Radio* (National Committee on Education by Radio, 1 Madison Avenue, New York), *Educational Screen* (Educational Screen, Inc., Chicago) and *Visual Review* (Society for Visual Education, Inc., 327 LaSalle Street, Chicago, free).

Education for greater achievement in the realm of science is largely the responsibility of science instructors. But social studies and English teachers can participate in building a broader base for this achievement, by helping students to see the social applications and consequences of scientific discovery and invention, to see where technological trends are leading us. Increasingly facts and generalizations from the field of science are becoming the subject matter of the social studies class, so interrelated are these areas in their implications for modern life.

Will there be employment for the thousands that will be thrown out of work with the widespread use of the tractor and the cotton picker in the cotton fields? Must these people be placed on relief or can other adjustments be made that will absorb them in our social-economic order? Will the public be able to resist intelligently the appeals of propagandists through increasingly better means of communication? Can the destructive uses of science in settling international disputes be halted? How can more of the achievements of science be applied to raising the standard of living in this democracy?

These are illustrative of hundreds of problems which hinge on the application of science to modern democratic living. Do they not demand study and discussion in our secondary schools?

Drawing by Omar P. Goslín from Kenneth M. Gould's *Windows on the World* (Stackpole Sons).

FOR EVERY CLASSROOM

(Covering material contained in pages 1-12 and 29-40, common to all editions.)

FRANKLIN

A lively recital of Benjamin Franklin's pioneering in the realms of science, invention, and other fields is given in Roger Burlingame's biographical sketch (3). Lead students to see the relationship between Franklin's range of activities and the unspecialized nature of his times. How did his knowledge and enterprises in many fields influence his writing? How were study and work coordinated throughout his lifetime.

Ask students to compile two lists: one of Franklin's scientific inventions and one of his cultural and political doctrines and achievements. Which are more important now?

POWER AND WISDOM

Man's failure to control the powers that science has given him is emphasized by the British philosopher, C. E. M. Joad, in **Apes in Airplanes** (5). Students should be led to consider Joad's proposal for the solution of this problem. How many agree with this plan for preventing the misuse of power? What would be the difficulties and dangers in establishing such a board as the one suggested in Mr. Joad's concluding paragraph? What better plan for coordinating power and wisdom might be more practical?

In a radio speech to the United States on October 16, Winston Churchill struck a note similar to Joad's when he spoke of "this wonderful agent of

the air, which our century has discovered but of which, alas! mankind has so far proved unworthy.

"This air menace, with its capacity to torture and terrorize women and children and non-combatants — this combination of medieval passion, of the weapons of modern science and the blackmailing power of bombing— this combination is the most monstrous challenge to peace, order and fertile progress that has appeared in the world since the Mongol invasions of the thirteenth century."

Students may find a practical discussion of planning for better use of science and resources in the chapter on "Each for All" in Kenneth M. Gould's book, *Windows on the World*.

Here the paradox of scarcity in the midst of plenty is described so clearly and dramatically that high school students may grasp fully one of the major problems confronting civilization. In the third chapter, "Brain Power and Horse Power," man's development of the machine is outlined with resultant social-economic gains and losses.

QUEST FOR LEARNING

The story of two mountain boys who make up their minds to attend school is related by James Still in **Journey to the Forks** (7). After reading the selection, students may be asked to consider what there is about the nature of man that leads him to seek knowledge through education, even at great cost and hardship.

What misgivings did Lark have about becoming a scholar? What devices does the author use to gain an effect of reality? Have you known young people who have gained an education in spite of difficulties? Write a short sketch based on an incident from their experiences.

PROGRESS OF INVENTION

A review of fields in which invention is making rapid progress is given in **Inventions Are on the March** (10). students may be asked to list the twelve inventions and the possible results of their use on American life. Which of these are likely to have the greatest effect on the life of your community?

Some students may volunteer to make a poster, mural, or frieze depicting the advance of American invention from colonial days to the present and leading on into the future.

READING SKILLS

Directions. Read the selection, **Science in Stamps** (32), for a review of the achievements of several famous scientists. A clarification of the meaning of several scientific terms should follow. At a signal from your teacher, begin to read.

When you have finished, record the time and compute your rate. (Teacher or student should indicate the time on the board.) There are 500 words in the article. Check your comprehension by matching the achievements of Group B with the scientists of Group A. Write the numbers of Group A, from 1 to 15, and match the corresponding letters from Group B beside each.

GROUP A

1. Benjamin Franklin
2. Thomas Alva Edison
3. Andre Marie Ampere
4. Count Alessandro Volta
5. Luigi Galvani
6. Nikola Tesla
7. Guglielmo Marconi
8. Louis Pasteur
9. Pierre and Marie Curie
10. Charles Darwin
11. Pilatre de Rozier
12. Santos Dumont
13. The Wright Brothers

GROUP B

A. Developed the electro-dynamic theory
B. Contributions in electrical science
C. The galvanic cell
D. Laid foundation for science of bacteriology
E. Scientific research in France
F. Theory of natural selection
G. Invented the incandescent light, the phonograph, and the cinematograph
H. Theory of balloons
I. American inventors in aeronautics
J. Honored by Brazil for work in aeronautics
K. Early American inventions
L. Invented the eudiometer, and the electroscope
M. Achievements in radio

Key to Test. 1. (K); 2. (G); 3. (A); 4. (L); 5. (C); 6. (B); 7. (M); 8. (D); 9. (E); 10. (F); 11. (H); 12. (J); 13. (I).

GUIDANCE

Have your students been wondering how to make the best selection of Christmas gifts for their friends? What do high school boys like to receive? What kinds of presents do girls enjoy most? Is there any really good system for making up a Christmas list? Refer them to this week's **Boy Dates Girl** (33) for the answers.

Students who collect stamps will be interested in Frank L. Wilson's description of *Science in Stamps* (34).

SOCIAL STUDIES

(Covering material in pages 13-S to 16-S and 25-S to 28-S, as well as other Social Studies features in the common sections.)

Refer to the *For Every Classroom* columns (1-T) for suggestions on the use of features on *Applied Science* in Social Studies classes.

PAN AMERICAN PARLEY

Problems confronting the Pan American Conference are described in **"New Monroe Doctrine" on Trial at Lima** (25-S). Discussion may center on the following questions: What is the purpose of the conference? What two problems are of greatest importance to the United States? Which countries are likely to support and which oppose President Roosevelt's defense plan?

Why are Latin American nations suspicious of the United States? Give concrete examples of the change in our Latin American policy from "dollar diplomacy" to "good neighborliness." What are the reasons for the increase of Nazi and Fascist influence in Latin America? What conditions of dictator-

National Council Meetings

It would take far more space than we have here, to give a rounded report of the meetings of the National Council of Teachers of English in St. Louis and the National Council for the Social Studies at Pittsburgh, from which we have just returned. *Scholastic* was represented at the former by Mr. M. R. Robinson and Miss Ernestine Taggard, at the latter by Messrs. R. D. Mathewson and K. M. Gould. So many people, events and ideas were crowded into those tightly packed days of meetings, sessions, luncheons, banquets, that our minds are still in a whirl, even after a night and a day of contemplation on the train. We enjoyed sitting in on some of the sessions and learned a lot we should know. We couldn't get to nearly all of them—too much excitement at the *Scholastic* booths. The high point of the conventions, to us, was meeting and talking with so many good friends of *Scholastic*.

At St. Louis a *Scholastic* luncheon was held Thursday noon, to which we invited all teachers who subscribe to at least 60 copies of the magazine. We had a fine time at our own party getting to know teachers, many of whom up until now had been, alas, just names signed to letters and to *Scholastic* Awards entry blanks. We now look forward to next year's convention, which will be held in New York City, when we shall have the opportunity to meet more of *Scholastic's* friends, and to entertain them.

The following officers were elected to head the English Council for the coming year: President, Miss Essie Chamberlain, Oak Park, Illinois; First Vice-President, Mr. E. A. Cross, Greeley, Colorado; Second Vice-President, Miss Angela Broening, Baltimore, Maryland; Secretary-Treasurer, W. Wilbur Hatfield, Chicago, Illinois.

The Social Studies Council was highlighted by stimulating addresses from Superintendent Ben D. Graham, Dean Holmes of Harvard, Dr. C. C. Barnes of Detroit, president, and Dr. Carroll R. Daugherty, economist of the Wage-Hour Administration. Next Thanksgiving the Council will meet in Chicago, under the presidency of Miss Ruth West, of Lewis and Clark High School, Spokane, Washington.

ship exist in the Western hemisphere? Describe the "bright spot" of the situation. (For helpful background material on conditions in South America, see *Scholastic's* Pan-American issue, Dec. 12, 1936.)

AMERICA'S PROBLEM

In the article, **Our Battle vs. Mein Kampf!** (26-S), Harold Rugg outlines the major aspects of America's foremost problem. As a stimulant to thinking this primary issue through, students may be asked to consider the obstacles and dangers inherent in its two main aspects:

(1) How can an adequate standard of living be established for every family in the United States?

(2) How can democratic social living be guaranteed on this continent? Explain in what ways Fascist government is the opposite of the democratic plan. What is the central idea in governing by the Fascist method? In what ways does the Pan-German philosophy oppose the outlook for democracy? Review Germany's present gains in her march of conquest. Do you agree with Rugg's suspicion that Britain's Tory government has connived with Germany in its program of expansion?

What barbarous acts of Hitler and the Nazis have proved that Fascism is a real menace to democracy? In what ways are major world powers interpenetrating Latin America? Why is Latin America such a fertile ground for Fascism? Is there a danger of Fascism gaining a hold in the United States? How can integrity of expression be safeguarded and encouraged in America?

NEWS QUIZ

The following questions may be used as leads to discussion of this week's **March of Events** (13-S to 16-S).

What steps have been taken to provide homes for refugees from Germany? Describe British plans for enabling Jews to settle in her colonies. What difficult problems will face those who attempt to establish homes in such regions? What objections does the Foreign Policy Association see in this plan? Discuss the pros and cons of allowing more of these refugees to enter the United States than our immigration quota permits (13-6).

What is the purpose of the Congressional-Executive Monopoly Investigating Committee? Describe some of the important questions this committee will have to answer. What method is the government using in its anti-monopoly cases? (15-S)

Discuss the importance of the Anglo-American trade agreements in addition to the resulting increase in trade. What classes of people will be directly benefited by these agreements in the United States and in Britain? (15-S)

Do you think that the proposal for "incentive" tax exemption of profit-sharing companies should be put into operation? What two organized groups are opposing the plan? (15-S)

What were the outcomes in the recent elections regarding anti-labor laws, pension plans, and the civil service system for selecting government job holders? (16-S)

What are the objections of national peace groups to President Roosevelt's program for defense? (16-S). Do you believe that these objections are valid? Do you see any weaknesses in them? If so, try to state them in your own words.

ENGLISH

(Covering material in pages 17-E to 24-E, as well as other English features in the common sections.)

DRAMA

A dramatic glimpse of the life and work of Charles Proteus Steinmetz is presented in the Federal Theatre's radio play, **Lightning in the Laboratory** (17-E). Discussion may center on how Steinmetz and other handicapped people have made great achievements in science and other fields.

An original radio play based on the life of a great man of science may be written and produced as a class project. Students may discuss films based on the lives of Louis Pasteur and other scientists. Encourage your classes to listen to the Federal Theatre radio plays based on Paul de Kruif's books. See **Literary Leads** (24-E).

POETRY

This week's **Poetry Corner** (20-E) offers an excellent springboard to the reading of poetry on the machine age. Discuss why modern poets are using today's environment in their verse. Do Stephen Spender and MacKnight Black find real beauty in our mechanized world or are they trying to assign beauty where there is none?

Other poems on the theme include the following: *Chicago*, Carl Sandburg, *Factories*, Margaret Widdemer, *Limited*, Carl Sandburg, *Mine No. 6*, Malcolm Cowley, *New York City*, Susanna V. Mitchell, *Prayers of Steel*, Carl Sandburg, *Smoke and Steel*, Carl Sandburg, and *The Ghetto*, Lola Ridge.

SCIENCE VOCABULARY

Are your students puzzled by scientific language? Herbert B. Nichols' discussion of **Does Science Make Sense?** (21-E) will give them a better concept of why scientific terminology is necessary for clarity and universal understanding. Discuss the process through which scientific language has been developing through the centuries.

What is the fundamental reason for the use of scientific terms? What is the difference between these words and other words of Greek and Latin derivation? Give illustrations of sources of scientific names other than Greek and Latin. What creatures and objects have been incorrectly named because of mistaken ideas? Describe Einstein's stated viewpoint and his actual practice regarding the use of scientific language. What class of scientific terms have been popularized? Why must youth have a better grasp of scientific terminology today than in the past?

WILHELMINA HILL

The teacher with a duster

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OFF THE PRESS

Ogburn, William. *Machines and Tomorrow's World.* New York: Public Affairs Committee, Inc., 8 West 40th Street, 1938.

This pamphlet deals with the impact of the machine upon modern life—on the farm, in industry, in transportation and communication, on the community, home, school, church, government, and international affairs. Social problems created or intensified by technology, such as unemployment, old age insecurity, crime, and divorce are set forth.

The need for planning for the future is indicated if we are to achieve a better social order and avoid catastrophe. But such planning cannot be accomplished unless we study trends in technological development carefully. A compact treatment of many of these trends, suitable for study by high school students as well as adults, is given by Mr. Ogburn in this clear-cut discussion of technological problems and achievements.

O'Rourke, L. J. *You and Your Community.* Boston: D. C. Heath and Company, 1938, $1.84.

A research study of five years has resulted in the publication of this civics text which aims to lead individuals to real understanding and intelligent action as community citizens. This text is especially suited for use in classes organized as civics clubs, as O'Rourke was in contact with 25,000 civics club members and their teachers during the period of his experimental study. Many of the materials of the text are descriptive of these clubs or suggested by their activities.

Emphasis is on understanding the problems of life in the community and the country. Actual contact and participation of students with community people and affairs are provided through the suggested activities. Both group and individual projects are suggested.

The subject matter of the course deals with such areas as nature of local communities, community services, government organization and functions, taxation, conservation, capital and labor relations, business conditions, employment, standard of living, consumer problems, production and distribution, transportation, communication, workers and vocations. The volume is rich in illustrative and graphic material.

Edwards, Violet. *Group Leader's Guide to Propaganda Analysis.* New York: Institute for Propaganda Analysis, Inc., 130 Morningside Drive, 1938.

This recently revised guide for the study of propaganda analysis contains a wealth of information and suggestions that will be of assistance to both teachers and students. The nature of propaganda and its role in the modern world, especially in a democracy, are presented clearly. Ways in which propagandists make their appeals are presented in order that the student may be able to recognize and understand their purpose.

Ways of treating propaganda analysis in several different fields are outlined with special reference to English, music, speech, art, history, journalism, current events, general science, social science, and mathematics.

Excellent suggestions are given for carrying on effective group work in school or adult organizations. Ten important points for carrying on group discussion are presented which will be valuable for the consideration of any class or group which makes an extensive use of discussion techniques.

Hamm, William A. *The American People.* New York: D. C. Heath and Company, 1938. $2.20.

A new history text has been published with the aim of clarifying the past and shedding light on what is happening in the present. Social and economic phases of American history are emphasized as a means of leading the student to an intelligent understanding of problems of American life.

Farm problems, big business, transportation, public utilities, immigration, the labor movement, conservation, ways of improving democracy, and problems of foreign relations are some of the topics treated. Problems, activities, vocabulary drill, and references are supplied for each subject.

The volume is beautifully illustrated with original drawings by those American artists, David and Lolita Granahan.

Columbia Encyclopedia. New York: Columbia University Press, 1938. $17.50.

The new edition of this invaluable reference work contains a 40,000 word supplement covering events which have taken place since the first edition was published in 1935. In that year Fey, Schuschnigg, and von Starhemberg were competing for the control of Austria after the assassination of Dollfuss. By the spring of 1938 Fey was dead, Schuschnigg imprisoned, and von Starhemberg in exile, and the country itself was reduced to the status of a German province. Equally momentous events, if not always so disastrous, have taken place in other countries in the last three years. They have all been reviewed here in concise and readable articles. Recent occurrences in the scientific and literary worlds are also noted, and there are numerous short entries bringing the biographical notices in the main part of the book up to date.

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Does Science Make Sense?

Why the Professors Don't "Speak Our Language"

By Herbert B. Nichols

"WHY," I was recently asked, "doesn't a scientist simply say what he means? Instead of talking about the 'negative coefficient of thermal expansion,' why doesn't he just say that something grows smaller as it becomes hotter?"

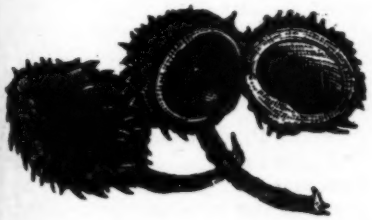
One must admit that technical talk is sheer gibberish to most folks, but, whether they know it or not, everyone — bundlebum, snitzy aristocrat, or just plain neighbor — belongs to some exclusive group with a language all its own.

This was forcefully demonstrated one day when a specialist in arachnids (spiders) was lecturing on his favorite subject in a small town in Maine.

After his semitechnical talk was over, a somewhat overenthusiastic person approached the platform and warbled, "I just had to come up and tell you how much I enjoyed your lecture but I must confess I couldn't understand you very well. Why do you call your spiders such horrid names? Why don't you just call them plain red spiders or black spiders or garden spiders?"

"My dear young lady," he explained, "here in Podunk you have about five common spiders, but in traveling around the world I have encountered at least two hundred different species, and there are a good many more I don't know about. Suppose you had to sit down and think up two hundred names for spiders without becoming grammatically absurd—what would you do?"

There's the situation in a glance.



So, whenever natural scientists are stumped for names or descriptions, they resort to either or both of our two most famous "dead" languages and know that, anywhere in the world, other specialists in like fields will understand what they are talking about—no matter what the local language may be.

Naturally the language of science doesn't adapt itself readily to ordinary conversation or inspire poets. *Ladybug, ladybug, fly away home* would be difficult if one were compelled to address this little spotted beetle as *Coccinella dipunctata, Coccinella dipunctata.*

The Origin of Names

But genuine technical language is sheer gibberish to most folk. To the director of brass polishing on the veranda of a naval man of war or to the queen of the office typewriter, the jargon of science appears equally complex and not only complex but unnecessary. Neither can understand, for instance, why the zoologist uses such a forbidding term as *entepicondylar foramen* when he's talking about a hole (in the forearm of certain mammals) so tiny that it can hardly be seen.

For that matter, why use the word *mammal* when talking about cats and shrews? Isn't *animal* good enough? Actually, it isn't. It doesn't convey exactly the meaning the scientist wants to impart. True, the cat and shrew are both mammals and animals, but the former classification is the more exact. Flies and sea anemones are animals too, but they are by no means mammals.

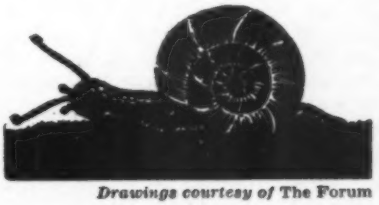
Essentially, this is the fundamental reason for the use of what the common man has come to call technical jargon. It may be all Greek to him, but in scientific circles it is just common talk. As a matter of fact, most of the so-called romance languages have their root words as firmly founded on Greek and Roman names for things as does the private language of science. The difference is purely one of familiarity or usage.

Once every three years, for example, botanists of the world gather in international conclave and discuss new theories and discoveries. An American may rise and produce a dried-up, mounted plant from his herbarium which, because of some newly discovered descriptive detail, he proceeds to describe to the German, Japanese and Italian delegates as "Solidago bicolor, having bracts of the much-imbricated involucre with abruptly spreading herbaceous tips, achenes glabrous or rarely a little setulose, inflorescence tending to thyrsoid and peduncles pubescent." No matter what the nationality of the botanist, he now knows the plant to be the silvery goldenrod of Eastern American roadsides, having stems with soft hairs, blossoms that are closely packed and firm, and tiny, hard, one-celled seeds, ordinarily smooth but sometimes bearing bristles.

Imagine what a task it would be to translate the foregoing passage into a dozen or more tongues so that the group might learn what the speaker was talking about.

But, while Greek and Latin form the source of most plant and animal names, they do not account for all. *Hog,* traced back to its origin is thought to be an imitation of the creature's grunt. *Gopher* is the Americanized spelling of the French *gaufre* (honeycomb), used by pioneers in Louisiana to describe an animal that honeycombed the earth with its burrows. *Lynx* comes from Greek and Latin words having to do with light, probably in reference to the animal's reputed ability to see in the dark. Mammoths, extinct elephants, were not so called because of their size, for actually they were smaller than modern elephants, but from the Russian word *mammot* referring to a burrower. The first specimens were found in frozen Siberian cliffs by people who reasoned that, when alive, they had lived underground like huge moles.

The mammoths were not the only creatures to be incorrectly named because of mistaken ideas. Early settlers in America noted characteristics in the North American flora and fauna that reminded them of European types. Consequently we have



Drawings courtesy of The Forum

many plants and animals bearing names that do not rightly belong to them.

For instance, the bird commonly called a robin is not a robin but a thrush. The robin is a small British bird, a third the size of Merula migratorius and only distantly related to it. They are superficially alike only in their red breasts. Again, the American warblers do not belong to

the real warbler family at all. True warblers are Old World birds. America has only one native warbler, but, instead of labeling it a warbler, we call it blue-grey gnatcatcher. Our so-called orioles are in reality blackbirds, unrelated to the true orioles, which again are an Old World family without representation in North America. The meadowlark is no lark but a blackbird. The Florida wood ibis is no ibis but a stork. There are true ibises in Florida, but they call these white curlews. There is also a turtle in the land of flowers called there a gopher. The common prairie gopher of the North they call a salamander. Florida has salamanders, too, but they go by the name of Congo eels.

But, before we blame the hard-working pioneers too much for getting us into difficulties with their naming of our wild life, let it be said that the early botanists and zoologists, men who should have known better, made just as many and just as bad mistakes. Plant collectors roamed up and down the continent, for instance, collecting at random specimens which were sent to Europe. Then the "experts," at a loss for names for new things, gave them the names of places from which they came. Thus we find today that plants first found as rarities in the Southern States carpet the fields and forests of Canada or New England, yet bear the specific name *virginiana, pennsylvanica, missouriensis,* or *caroliniana,* while weeds that overrun the South but happen to have been first collected in Canada bear the title *canadensis.*

For Specialists Only

The charge of professorial absent-mindedness is often a just one but may sometimes be excusable. It can be brought about occasionally by the relative scarcity of individuals trained in highly specialized branches of science. In fact, so few are the persons madly in love with the philosophical intricacies of higher mathematics that a certain well-known member of the National Academy of Sciences, one who writes on such things as "The Logical Definitions of Nonsingular Matric Polynomials," actually forgot his lunch one day when he found someone to talk to about his work.

He left his office punctually at the usual hour, bound for a cafteria. En route he stopped for a ten-minute chat with an advanced student. Following this interlude, he paused to reorient himself: "Now, where was I going? It must have been to lunch, but I see I'm headed toward the office, and it's one o'clock. I must have had lunch." Whereupon he pocketed his watch and strode back to work.

Such is the power of mind over matter.

Generally, professors form tight little social and intellectual groups to which outsiders are rarely admitted. Yet even the professors

themselves have little patience with the technicalities of departments other than their own.

One of the pet remarks of Harvard's President Emeritus, Dr. A. Lawrence Lowell, to a gathering of scientific men, is, "I fail to derive any special stimulation from discourses likely to parallel reports on the "Antennae of Paleozoic Cockroaches." You see, his particular field of joy is the critical examination of events in political economics and, lately, the more practical aspects of the administration of child-labor laws.

Albert Einstein is another man of note who has opinions regarding the use of technical language. "It should never be used to cover up meaning but rather to make it more clear," he says, yet what of this "non-technical" description of a lecture he gave in Pittsburgh before the American Association for the Advancement of Science? It was handed to newspaper reporters a short time before deadlines. They were supposed to write something besides funny remarks about big words and appreciations of the luxuriant growth of professorial beards. It follows:

Abstract of Einstein Lecture, released for Saturday morning papers.

It is well known that the equivalence between energy and inertial mass is one of the most important consequences of the special theory of relativity. The theoretical derivation of this principle is the subject of my lecture. From the Lorentz transformation and the assumption of the impulse and energy principle for material particles the form of the impulse and energy of the moving particles, as well as the equality of mass and rest-energy, is derived. The proof is based on the consideration of an elastic and an inelastic collision between two identically constituted material particles.

Garbled Language

Scientific names are the favorite target of those who accuse the researcher of verbiage too complex for common understanding. Yet who hasn't had an experience like that of the fisherman who wanted to initiate an acquaintance into the use of dobsons as bait? He couldn't seem to convey any idea of the sort of insect he meant. He tried *crawler,* which is the name Westerners use; *arnly,* a title popular in the South; *hellgramite,* highly favored in New England; and *hell-diver,* the common Canadian name.

Finally it dawned on the listener: "Oh, you mean conniption bugs. Gosh, I've used them for years."

Of course, like everything else, Latin names can be carried too far. Their use by a fish market advertising specials on mackerel, haddock, and fillet of sole, for example, would hardly do. One couldn't expect the housewife to think in terms of Scomber scombrus, Melanogrammus aeglefinus, and Solea vulgaris, even if the prices were bargains.

Astronomers, as might be expected, find no difficulty in soaring above the clouds in winged language. An account of the theory of the expanding universe, explaining the speed with which stars in space are traveling away from each other, was first written by the Belgian astronomer Georges Lemaître. But his paper saying the same thing bore the imposing title, "A Homogeneous Universe of Constant Mass and Increasing Radius Accounting for the Radial Velocities of Extragalactic Nebulae."

Nevertheless, astronomy seems to have the best-natured spokesmen. When an article about planetary nebulae comes out in the papers as dealing with sanitary nebulae or when *radial velocities* degenerates to *radio philosophies,* the researcher will patiently go on explaining that the central destiny of a star is not its central density and that spiritual admiration is not the same thing as spherical aberration.

Popularization

Meanwhile, the scientist, out of whose laboratory have come so many contributions to better living, stands a fair chance of grafting his terminology on the main stem of ordinary language. It is becoming essential everywhere that this take place, and so smoothly is it being accomplished in many instances that the public is hardly conscious of its acceptance.

At one time only a chosen few were initiated into the meaning of *automobile, telephone, static, thermometer, aluminum, electron, rayon,*

(Concluded on page 24-E)

The ROUND TABLE

The Student Writer's Own Page

Edited by Charlotte Van de Water

THIS week's Round Table has a little the character of Grandmother's what-not. On the first shelf are four more poems written by students who find their topics in what they see around them. On the second are an essay and a poem inspired by observation of people.

In this poem the writer sees imaginatively the emotional significance of an ornament in her home.

To a Jade Idol

Oh, little jade god, made by a lifetime of toil,
Surrounded by incense from your native soil,
How out of place you are on my mantel,
Where you are put to be ornamental.
How cruel that we should use you as such
When, far away, you meant so much.
But nevertheless, there you must stand
To re-create the ancient, the grand.
To furnish an atmosphere polished, refined,
To help me dream when I'm weary in mind.

Marjorie Joy Robineau, 13
Senn High School
Chicago, Ill.
Josephine Haff, Teacher

Another of the very young writers represented this week, Marjorie Little words her poem with a feeling for beauty.

In Northern Michigan

Blue water . . .
Sailboats gliding like white butterflies
Over its smooth surface.

Green pines . . .
A cool breeze sighing through the leaves
And making them whisper.

White gulls . . .
Wheeling and coasting over the forest,
High in the blue sky.

Sunlight . . .
Gilding the treetops and gleaming
Bright on white sails.

Marjorie Little, 13
Grosse Point (Mich.) High School
Zella Sloggett, Teacher

Good poems about the seasons are hard to write because the theme is hackneyed, but these lines have color, music and clarity.

Portrait

Autumn is a lovely lady
Who has stepped from a Rubens painting,
In her saffron and plum-colored gown,
With a halo of birch leaves
In her long, glowing hair.
Her hand is lifted over the earth
In a copper and russet benediction.

Margot Weber, 17
Stiver High School
Dayton, Ohio
Miss Helen Joan Hultman, Teacher

"Moon Magic" is another poem on a well-worn subject, but the metaphor and the picture give it distinction.

Moon Magic

The moon, a tipped canoe of beaten gold,
Sinks low in the western sky.
Dark clouds of night sail over it,
Threatening its oblivion.
A golden halo of mysterious light
Surrounds it.
As it sails behind an elm,
Making a pattern of black and yellow lace
Against the ebon sky.

Doris Chenoweth, 16
Alexandria (Pa.) High School
Miss Lois J. Harner, Teacher

Looking at the second shelf, you will enjoy the cleverness of the poem and the penetration with which the author of the essay has imagined the thought of another.

A Fable for Copy-Cats

A ribbon bow,
A roll and a curl,
That is the hair
Of the modern girl.
Her lips are shaped
As they ought to be,
And not as they were
Originally.

Her cheeks are pink
As a rose in June,
Her eyebrows look
Like a brand-new moon,
Her dresses are cut
Like this or that
So she won't look too skinny
And not too fat.

Now the outcome of all
This fuss and bother
Is this: they all look
Just like one another,
Just like new pennies
Fresh from the mints,
Or an epidemic
Of Dionne quints.

The last girl I expected
To catch the fad
Has the ditto-girl craze
Just as bad as bad,
And I think things are going
From bad to worse.
Who is that girl?
Why, it's me, of course.

Evelyn McQuillen, 16
Grand Rapids, (Minn.) High School
Miss Elizabeth L. Fleming, Teacher

SCHOLASTIC invites all high school students to submit their personal writing, the best of which will be published in The Round Table. Comment and discussion on writing problems will be given here. Students may also receive criticism on request by sending a stamped return envelope. Contributions may be in any literary form, but preference is given to essays and sketches not exceeding 500 words and verse totaling not more than 50 lines. Material submitted for this page will also be considered for the annual *Scholastic* Awards. Address: Round Table Editor, *Scholastic*, 250 East 43rd Street, New York City.

The Last Cigaret

I sat on the park bench and smoked one cigaret after the other. There was nothing else to do. The cigarets were the only thing I had to my name. And after I had smoked all of them save one, I looked at it and I thought: This is the last one, and I don't know when I shall have another, and now I see this cigaret, but soon it will be gone, except for a small burnt-out stump.

And I thought that is how life is. One moment you are clean and attractive and then suddenly you find yourself burning out, every day getting smaller and smaller, and then your light goes out, and you are dead, and nobody misses you and nobody wants you, because you have lived and been burned and you are useless.

And I thought that soon I should be a burnt-out butt; soon I should be lying in the ground and people would step on me, and they would feel no regret because I had gone. Maybe I would be taken to the county morgue and the coroner would say: Just another burnt-out stiff. No one would claim me and no one would know me, and there I should lie until I was buried at the expense of the county. When I was gone, new people and new cigarets would catch fire and slowly burn out, and some would burn fast and some would burn slower than others, but in the end they would all burn out.

I thought all these thoughts while I looked at my last cigaret, and I found I could not smoke it, and I called myself a sentimental old fool, a doddering, stupid old man, but still I could not smoke it. I put it in my shirt pocket and I sat with my head in my hands. Pretty soon I began to sob because I knew that soon my time was up to live and kick and swear and fight and starve and beg upon this earth that had caused me so much misery, and even though I hated life I was afraid to go, and I did not know why I was afraid, but my being afraid made me weep.

Soon the sun went down and dusk settled over the park, and my tears dried, and I began to crave a cigaret. I stood up and walked to the corner. I stood there a long time pondering. Finally I made up my mind, and so with a shrug of my shoulders I took out the cigaret and lit it.

Arthur Carlbom, 17
Austen High School
Chicago, Ill.
Miss Safford, Teacher

Literary Leads

MEN AGAINST DEATH

The Federal Theatre Radio Division has dramatized Paul de Kruif's five popular books *Microbe Hunters, Hunger Fighters, Men Against Death, Why Keep Them Alive,* and *The Fight for Life.* These programs, broadcast by the Columbia Broadcasting System, have now covered the first two books on this list. Saturday, Dec. 10, marks the beginning of the dramatization of the third book, *Men Against Death.* Listen in this Saturday at 9-9:30 for the first episode which is the heroic story of Ignatz Semmelweis who taught doctors to have clean hands and clean instruments. Official medicine considered him insane, but the world today recognizes him as a benefactor.

BOOK CLUB SELECTIONS

Literary Guild:

December: *Count Belisarius,* by Robert Graves. *Random House.*

January: *Dr. Norton's Wife,* by Mildred Walker. *Harcourt, Brace.*

Book-of-the-Month Club:

December: *Leonardo da Vinci,* by Antonina Vallentin. *Viking.*

January: *The Unforgotten Years,* by Logan Pearsall Smith. *Little Brown.*

Catholic Book Club:

December: *Louis XIV,* by Hilaire Belloc. *Harper.*

Book Union:

December: *Man's Hope,* by Andre Malraux. *Random House.*

Laboratory Lightning

(Concluded from page 19-E)

VOICE: It's lightning! He has produced artificial lightning!

REPORTER *(eloquently)*: That's it! That's it! Boy what a headline! What a headline! . . .

(Reporter is drowned out by clicking of many typewriters—newspaper room scene . . . gradually this merges into thunder of presses turning out the papers . . . fades into cry of newsboy.)

NEWSBOY *(off)*: Wuxtry! . . . Wuxtry! . . . *(coming on)* Extra! . . . Modern "Jove" hurls thunderbolts! . . . Electrical wizard invents thunderstorm! . . . Steinmetz harnesses thunder and lightning! *(fading)* Extra! . . . Extra!

ANNOUNCER: Centuries before Christianity, the Norsemen invented a group of Gods, which represented types familiar to their inventors! "Loki" was one of these! He was the God of Fire, and master of all kinds of wisdom! But "Loki" was not a full blooded "God"; he didn't really belong! The other "Gods" jealous though they might be, respected his power and followed his advice and counsel faithfully. So it was with Steinmetz. Deformed! Fearfully handicapped all his life, he rose to undreamed of heights. From his brain came the solutions to the mightiest problems of a mighty industry! General Electric, and the electrical world revered him as the ancient Norsemen had revered their "Loki"! Call him what you will . . . Charles Proteus Steinmetz, "the electrical wizard" has earned his place as a true "Pioneer of Science!"

Does Science Make Sense?

(Concluded from page 22-E)

airplane, pasteurized, electricity, nitroglycerine, petroleum, nitrogen, and countless other polysyllables.

Among newer scientific terms which promise to be as acceptable tomorrow are *plastics, radio power transmission, paradichlorbenzene, isoprene, synthetic foods,* and *rocketeering.* Soybeans already contribute spare parts to the automobile; there is probably no better moth protection than paradichlorbenzene crystals; isoprene will be the basis of good artificial rubber; and rocketeering may, in some distant future, take us to the moon or elsewhere in space.

Yet, whatever claim modern research may put forth for honors in having given us a high standard of living, the production of scientific language can hardly be considered an innovation of this age. It has been developing for centuries. The beginning came when Aristotle's curiosity laid foundation stones in six main divisions of science, and he was followed by researchers who for generations after the Dark Ages preserved their discoveries for posterity and saved themselves from persecution by talking a language they alone could understand.

And here is a hint for the modern parent. Instead of holding a family spelling bee when there's c-a-n-d-y around that B-a-b-y can't have and when you want to slip off for an evening at the m-o-v-i-e-s, keep your secret by borrowing a few scientific terms. Announce to the Missus that you have brought home two and a half kilograms of highgrade cacao-sucrose and that, following the evening meal, a dossociation with local environment will be followed by a transitory mental absorption in neoteric flicker artistry, projected from 35-millimeter cellulose-acetate images.

And now in luctual resipiscence I offer subdolous exomologesis for my ignavia and scelestic laches incomperendinating my scommatic pollicitation of an idoneus but infrunite bam or mycterism. Academic ataraxia and exantlation from indesinent molimínous indagation are, however, more conducive to nagacious insulsity or hebetudinous paralereme than rabulous procacity and flosculation.

In short, I apologize.

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BOOKS
OLD *and* NEW

By May Lamberton Becker

IT IS seldom that I can suggest to you in one of these columns two books of such general importance as those I present to-day in connection with the Applied Science number. They are both "surveys" of the self-educator type: reports on science and invention, authoritative but not technical, meant for the general reader but not playing down to his supposed lack of intelligence. No, it will take you all your time to keep up with these writers: they do not write in words of one syllable—but if you are at all interested in these subjects and if your studies have led in this direction even a little way, you will be quite different from most people if you do find both these books easy to read and hard to stop reading.

Science for the Citizen is by Lancelot Hogben, whose *Mathematics for the Million* last year made people the world over take a new interest in mathematics because all at once they saw this subject in a new light and realized how intimately it was concerned with the daily life and thought of the world. *Science for the Citizen* is, as the author says, "based on the social background of scientific discovery." It considers the history, development and present body of experience and opinion of astronomy, physics, chemistry, biology and psychology, as these affect social problems; it is this latter feature that gives the book, large as it is and containing such an immense amount of material, the unifying quality that holds all together and gives it drive in one direction. Its five parts are each concerned with the progress of science toward conquest: the conquest of time reckoning and space measurement, the conquest of power, the conquest of hunger and disease, and the conquest of behavior. It is of the same general type as the school of H. G. Wells, but he keeps closer to the facts and knows more about the theories of present-day science: at least, so I am assured by people who know a great deal about such matters.

The March of the Iron Men, by Roger Burlingame, (from which "Benjamin Franklin," on page 3, is reprinted) is another large book, covering many matters, meant for the general reader, and holding together because it has a definite program and conviction. Mr. Burlingame believes that the social pattern of our democracy may best be seen through a study of our inventions. This book is a history of the United States from the printing press to the close of the Civil War, in terms of its inventions. You need not agree with the author's thesis to find his book—and its illustrations—vastly interesting.

"New Monroe Doctrine" on Trial at Lima

PLANS to protect the New World from Fascist and Nazi penetration are being discussed at the Pan American Conference, which opened at Lima, Peru, December 9. (*Schol.*, Dec. 3, p. 14-S.)

America's new defense plans, and the extension of its "Good Neighbor" policy in the 20 Latin American States, are now "on trial" as Secretary of State Hull's delegation meets with our Southern neighbors.

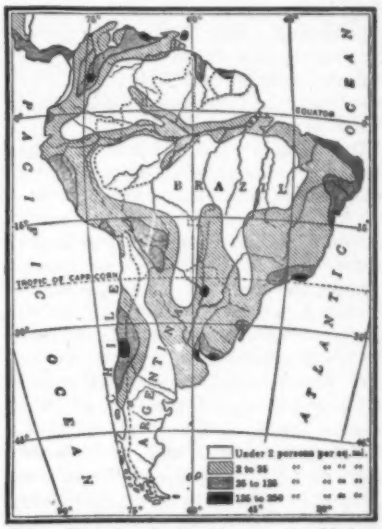
Two very important problems face the Lima Conference: 1. Secretary of State Hull hopes to extend his reciprocal trade agreements to more Latin American nations, and halt German-Italian-Japanese threats to our business. (*Schol.*, Dec. 3, p. 14-S.) Argentina's growing trade with Germany; Salvador's purchases of aircraft from Italy; and Chile's heavy trade with Japan, are a few of the obstacles Hull faces.

2. President Roosevelt wants all Latin American States to cooperate with the United States in defending the New World from possible Fascist aggression. Speaking for Brazil, South America's largest nation—larger in fact than the United States—Foreign Minister Oswaldo Aranha supported the President's defense plan. But Foreign Minister Jose Cantilo of Argentina, South America's richest country, flatly rejected such a project. Argentina, he said, would continue to cooperate to preserve peace in Latin America, but feels that a defense pact is unnecessary. And it will oppose any plan for an American League of Nations to preserve peace in the New World. Several other States are cautious because they fear American attempts to meddle in their affairs.

Latin American suspicions of Uncle Sam are based on past history. In 1823 we aided the young Latin American Republics by issuing the Monroe Doctrine. It opposed France, Russia, Prussia and Austria in their plan to help Spain regain possession of her rebellious colonies in South America. Grateful for this aid, Latin Americans were outraged, however, at later events. Before 1898 the United States began using the Monroe Doctrine to justify the sending of troops to restore order in Cuba, Haiti, Santo Domingo, Panama and Nicaragua. President T. R. Roosevelt argued that America should keep order in the New World to prevent European nations from meddling. The famous U. S. Marines became a "bill collecting force" under our "Dollar Diplomacy" policy of encouraging and protecting American investments in Latin America. (*Schol.*, Nov. 5, p. 9, 11.)

Under President Hoover (1928-1932) "good neighborliness" began to replace "Dollar Diplomacy," and all troops were withdrawn from Latin American nations. In 1933, President Roosevelt's "Good Neighbor" policy was advanced by Secretary of State Hull at the Pan American Conference in Montevideo, Uruguay. In 1936, President Roosevelt encouraged the calling of the Inter-American Conference for the Maintenance of Peace. Meeting at Buenos Aires, Argentina, Latin American delegates applauded Mr. Roosevelt's vigorous defense of democracy and promised full cooperation to preserve peace. The United States agreed that all Latin America should have a hand in defending a "new Monroe Doctrine" based on the interests of all and not of one.

Despite their promises, only a few Latin American nations—Argentina, Colombia, Chile, Costa Rica—have governments that can be called truly democratic, and elected by the people. Meanwhile, in Brazil, Peru, Chile, Argentina and others, both Germany and Italy have increased their influence. Nazi and Fascist political parties are growing in Latin America, and democracy is threatened constantly. There are several reasons for the above situation. For example, the early settlers in New England and along the Atlantic Coast were mainly home-makers who knew something of political freedom and wanted democratic government by the people. In South America the early arrivals were adventurers who sought quick wealth. These Spaniards and Portuguese lived under kings, believed in the power of the upper class, and knew little of democratic government. When Latin American Republics won their freedom, and tried to set up democratic governments, small groups of military leaders and wealthy landowners fought them bitterly. These small groups still do most of the ruling today, and are meeting determined opposition from the masses of farmers and workers.



From *Changing Civilizations in the Modern World*, by Harold Rugg (Ginn)

Density of population in South America

In Brazil, President Vargas has seized dictatorial powers and dissolved all political parties. Similar conditions exist in Paraguay, Bolivia and Peru, to cite a few. There is one bright spot in this situation: Latin American nations may be ruled by dictators, but these dictators have shown little liking for the German or Italian brand of Fascism. "President" Vargas of Brazil recently smashed an alleged Nazi revolt, and Chile also quashed a Nazi uprising. For this reason, they may welcome a

(Concluded on page 28-S)

Ray in the Kansas City *Star*

GOOD-WILL TOUR

Our Battle Vs. *Mein Kampf!*

Fascism's Challenge to Democracy

By Harold Rugg, Ph. D.
Scholastic Contributing Editor

THERE is one great problem before our people. Not a hundred problems! Not twenty! One! I shall call it The American Problem. Stated briefly it is: to build on this continent a social order of economic abundance and political democracy. The American Problem has two major aspects: (1) producing and distributing to every family in our country an adequate physical standard of living; (2) preserving the fundamental rights of democracy, especially free speech, free press, free assembly, and religious and racial freedom and tolerance.

In this article I shall not discuss the vast domestic problem of producing and distributing an abundant physical life on this continent. I have already done that many times in *Scholastic.*[1]

But the crux of The American Problem is guaranteeing *that social life on this continent shall be carried on democratically.* For a hundred and fifty years our "American Dream" has been of such a *democratic* society; one, as James Truslow Adams says, in which "each man and each woman shall be able to attain to the fullest stature of which they are innately capable." For a hundred and fifty years we have been convinced that we can make that dream come true. And it has come true here to a greater extent than in any other large country in the world.

The Menace of Fascism

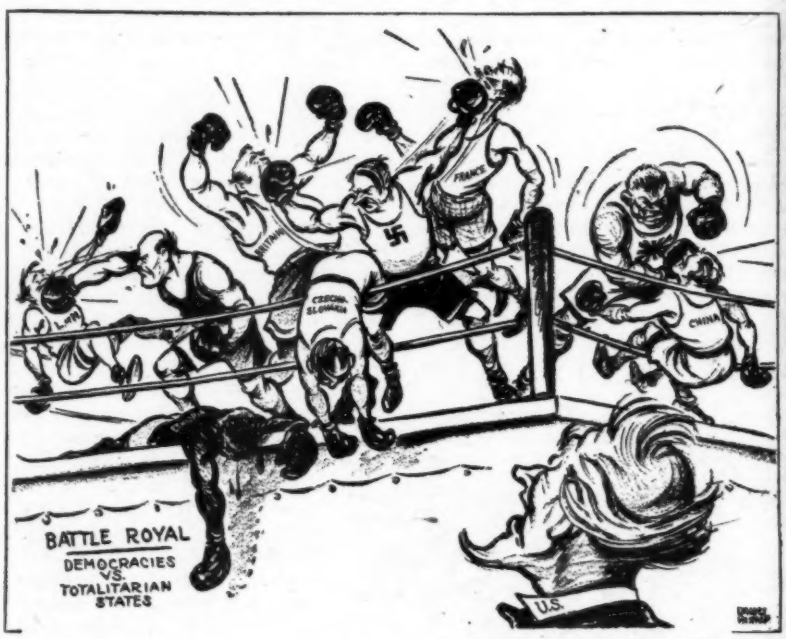
But with great violence, our favored democratic way of life is being attacked around the world by a new and powerful enemy. We mean those governments of Hitler in Germany, of Mussolini in Italy, of the War Party in Japan and that system of society known as "Fascism." Most of the features of "Fascism" are not at all new; for example, the form of government is as old as recorded history itself—the ancient rule of Might in the person of a Dictator. Every "fascist" government today is an absolute government of One Man or of a Few Men—whether it be called monarchic, oligarchic, imperial or fascist, and whether the ruler be called Duke, King, Emperor, Führer, or Duce. Thus in form of government it is the very opposite of our treasured democratic way—that is, government by the consent of the governed.

In its method as well as in its structure of government "Fascism" is not new. In all fascist regions the central idea of governing is *might-makes-right.* Consider, as a single example, the situation in Germany. A vast Pan-German literature[2]—some of it more than a century old—reveals the dangerous nature of the enemy we have to meet. Note by a few examples how the Pan-German (or world fascist) philosophy combats the American democratic outlook.

Perhaps never before has there been such a fanatically self-conscious philosophy of government by "the-one-chosen-people." So firmly do Pan-Germans believe in their world destiny that they refer to themselves as "The People!" The only peace their philosophy will tolerate in the world is "a German peace imposed by force." Fichte wrote a century ago: "Between States, there is neither law nor right save the law of the strongest." Hitler and a large company of Pan-Germans (and the Italians and others would act the same if they possessed the intellectual interests and background of the Germans) are affirming the same philosophy today. For more than a hundred years from Herder, Schiller, Fichte, Hegel to the Nazi propaganda bureau today the idea has been passed on that the German people is the one people "which has the moral right to fulfill its destiny by every means of cunning and force." From Hegel to Hitler, the German philosophers have defended imperial policy and made a religion out of war.

In one respect, however, Fascism is new, namely, in its sudden gains in strength and its current, increasingly successful bid for world power. It is actually becoming a menace both as an enemy on all our world frontiers and as an insidious propaganda force against democracy within our borders.

Democratic peoples everywhere have had startling warning of danger by the astounding success of German



Bishop in St. Louis *Star-Times*

THE WINNAHS!

[1] Suffice it to say that distinguished economists and engineers alike agree that by running the present economic system efficiently an adequate diet standard of living could now be produced and distributed to every family in America. The Brookings Institution economists say $3,200 per family of four per year; the engineers — for example, Loeb, Polakov, Fraser—say $4,500. See Kenneth M. Gould's *Windows on the World.*

[2] The best secondary introductions are such accounts as Aurel Kolnai: *The War Against the West;* Henry Wickham Steed: *Hitler: Whence and Whither* and *The Meaning of Hitlerism* and *Vital Peace. A Study of Risks;* Edgar Mowrer; *Germany Puts the Clock Back.* If only one book can be bought, buy Kolnai.

imperialism under the Hitler Pan-Germans since 1933. In recent articles in *Scholastic* we have shown how, in less than six years, a defeated and demoralized Germany has been awakened, given confidence, rearmed, and launched on a campaign of world conquest (see *Schol.*, Oct. 15, p. 3). Since March, 1935, the German government has defiantly scrapped the Versailles treaty, built a powerful army and navy, re-militarized the Rhineland, taken the Saar, sent military aid to the Fascist rebels in Spain, taken Austria, dismembered Czechoslovakia and made her an economic and political dependency of Germany, broken up the Little Entente and brought the Danubian countries within the German orbit. This astounding program has been carried out in less than four years *with the consent*, and, many students are convinced, *with the connivance of the Tory government of Great Britain*. Whether there really was a war crisis in September, 1938, whether the Tory-imperialistic class of Britain has actually given Hitler to understand that he can have his way as long as he does not endanger the British Empire, we do not know. But, as I have shown (*Scholastic*, November 5, 1938), there is much evidence to support that conclusion; witness the manner in which the past century and a half of British imperialistic history confirms the record of events of the past six years.

Divine Right of Kings
DIVINE MISSION IN ASIA
DIVINE SUPERIORITY OF ARYAN RACES WITH ESPECIAL REFERENCE TO TEUTONIC PEOPLES AND WITH VERY PARTICULAR REFERENCE TO A. HITLER, ESQ.
DIVINE MISSION TO SPREAD THE BLESSINGS OF FASCISM

From the Eau Claire *Daily Telegram*

Things Don't Seem to Have Improved Much

Fascism's Bid for World Power

It is clear that Americans, concerned with staggering domestic problems of unemployment and economic reconstruction and determined to preserve democracy within their own borders at any cost, confront the probability of a world advance of German imperialism, accepted, even supported by Britain, and with France and the other democracies showing little power of opposition. The Nazi "time-table" outlined in my recent article, announces boldly that Germany has a definite program of world conquest. If this sounds fantastic to Americans let them remember that many of its items are merely the continuation of the six steps already carried through. Let them also remember that Italy has taken Ethiopia; Japan has helped herself to Manchuria and the five northern provinces of China and is now in the incredible process of setting up a puppet government over most of that country — all without a significant move in opposition from Great Britain, France, Russia, or, the United States.

That Fascism is a real menace to democracy we have had sufficient proof in the barbarous acts of Hitler and his tyrannical Nazi aides. The facts are established that:

They have seized tens of thousands of German citizens, imprisoning them under unspeakably barbaric conditions of disease and indecency in so-called concentration camps.

They have wantonly destroyed, looted, and confiscated without pretense of due process of law the business, church, and residential property of law-abiding German citizens.

They have stamped upon intelligence in every conceivable way—closing schools and colleges to great sectors of their population, exiling and imprisoning distinguished men and women of science, contemptuously demeaning those honored by the Nobel Prize Commission and other international juries of peace and creativeness.

They have made freedom of speech, assemblage, press and worship impossible in any school or college, neighborhood or community.

They have burned the world's great books, banned the world's great music, and reduced the arts generally to the one purpose of serving the Nazi government's propaganda.

They have done away with the mechanism of the suffrage, including the secret ballot, and have destroyed all of those civil and political rights which the democracies of the world have spent hundreds of years to establish.

They have honeycombed the entire culture of Germany with a system of espionage that invades the privacy of every German home.

Perhaps you are thinking: "But these events are taking place in middle Europe. Hitler has extended his control to the Black Sea, it is true. He may even attack Russia with the aid of Japan, and it is possible that together they can crush the Red armies. But it is fantastic to think that they will extend their conquests to our borders." Is it? Consider two facts: (1) the fact of the spread of fascism in Latin-America; (2) the fact of fascist activity *within* the United States.

An inter-continental campaign of propaganda is being carried on in the twenty Indo-American[1] countries by five major world powers — Japan, Germany, Italy, Britain and the United States.[2]

The interpenetration is being carried on by each government along every front—by subsidized trade, by the purchase and development of natural resources, by immigration into the Latin-American countries, by a terrific barrage of propaganda, including hourly radio broadcasts from Germany, by a regularly-scheduled airplane service between Europe and Latin-America, by an elaborate system of spies and by propaganda among European emigrants which insists on their loyalty to the homeland above any other national allegiance ("Once a German always a German" . . . "race above country").

Perhaps the greatest danger to us is that Latin-America is fertile ground for the development of Fascism. For a century most of the governments there have been "dictatorships." With the exception of Mexico and perhaps Costa Rica in recent years the man with the best army has ruled. Literacy in Indo-America has lagged far behind the level of that of the United States and other "western" nations, and only a tiny fraction of the people have had a real understanding of the economic-political problems of their respective countries.

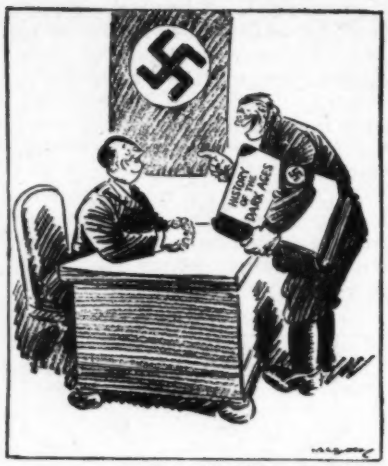
Indeed, the whole scene in Indo-America is much more favorable to Fascism than to democracy. In geog-

[1] Let us use the term "Indo-America" when thinking of the bulk of the people of original "Indian" stock, who, decade by decade, are becoming more "Amerindian"; and the term "Latin-American" when thinking of the wealthier and cultivated "upper-middle" business and social classes of "Spanish" blood.

[2] See Carleton Beals: *The Coming Struggle* for Latin America (1938) for the best current account.

raphy it is much nearer by airplane transport and radio communication to western and southern Europe than to the United States or to Great Britain. In racial and regional antecedents its white population is "Latin" and hence close at least to Italian developments. (It is estimated that 35 per cent of the people of Brazil today have some Italian blood.) With the exception of short interludes of liberal rule in a few countries, it has lived under dictatorships for the better part of four centuries. In educated intelligence the bulk of the people lag far behind those of America and other democratic countries. From every standpoint, both Latin-America and Indo-America constitute a more favorable nourishing ground for fascist ideas than for democracy. (See Pan-American issue, *Schol.*, Dec. 12, 1936).

Thus the lines of "Our Battle" sharpen clearly. In every skirmish of the past few years democracy has been defeated. The great totalitarian offensive is under way. What we



From the Syracuse *Herald*

Boss, I Got a Great New Idea

laughed at as strutting, screaming comic-opera straw-men have become at this moment the absolute rulers of not less than 400,000,000 "Europeanized" peoples on four continents. The advance of fascist force and totalitarian ideas now constitutes no less than a vast encircling movement around the world.

One of the gravest dangers is that America itself is a potential nourishing ground for fascist ideas and attitudes. For a century we have had a tradition of vigilante oppression of all "outlander" groups. Decade after decade, as wave after wave of new immigrants stormed our coastal valleys, the "old families"—the F.F.V.'s—fought to keep them out, snubbed them, deported them, and—failing that — tarred and feathered them, beat them, or jailed them.

Throughout the century the fear and hatred of immigrants flared up in a succession of Know-nothing movements—against the Irish Catholics of the late 1840's, against the Negroes of the south by the first K.K.K.'s of the late 1860's, against the Catholic Church in the A.P.A. terror of the 1890's, against the Jews, the Catholics and Negroes in the K.K.K.'s of the 1920's.

Lima

(Concluded from page 25-S)

certain amount of American cooperation against outside threats. But for the same reason, the United States must go slowly or she will arouse the opposition of Latin Americans who fear a revival of U. S. "imperialism" and "dollar diplomacy."

At this moment, Latin America's attitude toward the refugee problem is important. Argentina, Brazil, and Uruguay, South America's three main nations along the Atlantic coast, are inclined to welcome only immigrants who are farmers. They want settlers who are equipped to develop their vast, thinly populated, areas. Since Germany is stripping Jewish refugees of all their wealth, these refugees will be in no position to settle in South American regions unless they get a lot of financial aid. If financial aid is forthcoming, and the Jews agree to become farmers, certain undeveloped regions of South America could be opened to them.

Poland

(Concluded from page 14-S)

ritory in southeastern Slovakia, but they opposed the Polish-Hungarian plan to establish a common frontier by annexing Ruthenia. Hitler wants the rest of Czechoslovakia under his control as a possible roadway when the Nazis continue their "Push to the East" against Russia. Fearing that a future Russo-German war would be fought on Polish soil, Foreign Minister Beck has sought to build up a neutral bloc of nations between Germany and Russia. According to Beck, Europe is now divided into two armed camps, and Poland and Hungary must protect themselves by organizing a "Third Europe" of neutral nations. Anti-Czech demonstrations were numerous in Poland, and Premier Bela Imredy of Hungary resigned when criticized for not obtaining Ruthenia from Czechoslovakia. It is doubtful, however, if Poland and Hungary will risk trouble with Germany to form a "Third Europe."

In Spain, the Loyalist government denounced British-French efforts to reach an agreement with Italy over the Spanish Civil War, and announced that no "Munich settlement" would be tolerated. Officials hailed the arrival of the American ship *Erica Reed* with food and medical supplies, but admitted that Loyalist Spain's 13,000,000 inhabitants faced starvation unless more aid arrived.

Pope Makes Second Speedy Recovery; Resumes Tasks

Pope Pius XI, to whom millions of Roman Catholics throughout the world look for religious guidance, was recently stricken ill with a violent attack of cardiac asthma. Because he is 81, the Pontiff's physicians feared for a time that the attack might prove fatal. But within a period of three days the Pope had resumed his regular official duties.

Refugees

(Concluded from page 13-S)

with scant communications. Tanganyika and Guiana are both countries of wild animals, poisonous snakes, and deadly insects. Of the total area of 89,480 square miles of British Guiana, the area suggested for Jewish colonization — 10,000 square miles — includes a strip of low-lying coastal land, where coffee, sugar, rice and other tropical products can be grown, and strips of jungle and open country. A river will be the sole means of communication. Less wild than Guiana, Tanganyika owns several rail lines and automobile roads. Its European population, however, was less than 9,000 in 1936, of whom 2,939 were Germans and 4,165 British. Discussing the difficulties and expense of such settlements, the Foreign Policy Association declared in a bulletin:

The cost of settlement—generally figured at $2,500 to $5,000 a family —precludes its adoption on a large scale. Assuming an average cost of $3,500 it is apparent that the cost of settling 1,000 families would be $3,500,000; and of 100,000 families $350,000,000. . . . A long and difficult period of training, moreover, would be necessary to adapt city bred people to pioneer life. . . ."

These objections have caused some commentators to denounce the British proposal as an effort to develop colonial lands at the expense of refugees who are ill-prepared for the difficult task.

Modern Industry Travels on Brains

The Research Laboratories of Great Corporations Are Sprouting Technical Miracles

THE world we live in runs because some people know a lot of facts and other people put those facts to use in building or making something. But nobody, not even Einstein knows even a tithe of all there is to know about the world of nature and its laws. When you come right down to the bed-rock facts of what our world is made of, how it was made and a lot of other big questions like that, nobody can do any more than make a guess. Still the known facts about the world fill volumes and libraries and yet new facts are announced every day.

But although "pure" science, which has given us most of the facts we know, still has a lot to learn, "applied" science is running far behind. Applied science hasn't caught up with the scientists in their research laboratories yet. But in the laboratories of industry, the facts of the scientific laboratory are constantly being put to work to make new machines and to find new uses for known materials.

Much of the newest and most important applied science is still almost unknown to the man in the street. We cannot claim here, to do more than scratch the surface of what is being done, so we are presenting only a few highlights in each major field.

Ward Harrison of General Electric with a lamp that gives 120 times the illumination of an ordinary filament lamp.

Silkworm's Superior

The silkworm had better look to his laurels in earnest now, because the one field which remained the province of his product has now been invaded by chemistry. That is the silk-stocking industry. E. I. du Pont de Nemours & Co. has recently announced that by some chemical abracadabra coal, air, water and other substances have been fused to make a fiber called *nylon*.

Unlike most other synthetic fibers which can be spun and woven or knitted, nylon is not a cellulose made from cotton linters or from wood or vegetable fiber. Neither is it a casein, made from skim silk. Chemically, it is a protein. Its chief characteristics are extreme toughness and strength. It can not only be stretched out into very thin fibers for thread, but it can be shaped into such unlike forms as bristles for brushes and sheets. Strange and wonderful to be sure, and the layman must make what he can out of those many odd and seemingly contradictory properties.

The great significance of nylon, however, is that it has a structure more like that of real silk—which is a protein—than any synthetic fiber which has been produced up to date. Dr. Charles M. A. Stine, Du Pont Vice-President, says, ". . . . Nylon can be fashioned into filaments as strong as steel, as fine as the spider's web, yet more elastic than any of the common fibers and possessing a beautiful luster. In its physical and chemical properties, it differs radically from all other synthetic fibers."

Nylon takes dyes and finishes very well. Water tests show that it absorbs only about 12 per cent as much moisture as rayon does under like conditions. This is precisely what the hosiery manufacturers have been looking for as a real silk substitute. Rayon thread never made satisfactory hosiery. It would neither stretch nor hold its shape nor shape itself to a leg as silk will. Nylon being more elastic and less sensitive to water than silk and rayon should be—not as good as real silk—but better.

The next thing you know, you will not only be wearing hosiery made of nylon, but you will be brushing your teeth with a brush holding nylon bristles. Experiments are being made to test nylon also for sewing thread, tennis racquet strings, velvet, cloth, a wrapping film (like cellophane), trout-fishing leaders and plastics.

The Du Pont Company is not rushing into nylon manufacture on a big scale yet, but the firm believes there are at least 200 possible applications of nylon in industry. Perhaps the biggest field is in the silk-stocking trade, now supplied by $100,000,000 worth of Japanese silk a year. The company has set aside about eight million dollars to build a new plant at Seaford, Delaware, for the manufacture of nylon. However, it will be a year or more before anything but experimental nylon is made.

Electro Metallurgical Co.

Coils of hot, rolled stainless steel, among the most useful of the modern alloys, being tested.

March of the Metals

To keep applied science from standing still, constant research in the nature and uses of metals is necessary. One of the most modern of the metals is aluminum which recently celebrated its fiftieth birthday. (The first commercial aluminum was made in 1888.) During that time the price of aluminum has dropped from $8 a pound to about 20 cents, and it now has some 2,000 uses.

There have been few changes in the method of making aluminum from bauxite ore. But aluminum is still a pretty expensive metal, compared with steel. The expense lies in the manufacturing process developed by Charles Martin Hall in America and at the same time by a Frenchman named Paul L. T. Heroult, who hit upon the same process. They both used a cheap electrical method of separating aluminum from its bauxite ore. Bauxite is a dull rock—red, yellow, pink, buff or almost white. Its color depends upon how much iron and other impurities there are mixed with aluminum. After it is mined, the bauxite is washed, treated chemically, filtered and baked until a pure, powdery oxide called alumina is obtained. The aluminum and oxy-

 Note: In English Edition, pages 25-28 (Social Studies Section) are omitted.

gen are in such a tight combination that nothing but the great energy of electricity will separate them. This explains why aluminum is still expensive, for it requires ten kilowatt hours (enough to keep a 60-watt bulb burning for a week) to produce one pound of pure aluminum.

The aluminum leaves the electric furnace in a molten stream and is cast into pigs ready for shaping. By nature it is soft and weak and it must be combined with various alloys to gain strength. Its great advantage is that it is only one-third as heavy as cast iron; it will not rust, does not tarnish easily, can be worked readily and can be cast and welded.

Although aluminum ranks fifth in the metals used in industry, it seems the answer to the needs of the "streamlined era" in transportation. The "Zephyrs," the "Rockets" and other streamlined trains are made of sheet aluminum. Airplane bodies, dirigibles, automobile parts are of alloys, especially duralumin.

Most of the aluminum in America has been made by Alcoa, the Aluminum Company of America in Pittsburgh, which has had something like a monopoly ever since Hall formed a partnership and started the company in 1888. However, it is likely that other manufacturers will use other processes which will extract aluminum, the commonest metal on the earth's surface, at less expense than the Hall process. At least three of these new methods would yield by-products which would help pay the expense of extraction.

The transportation industries now use the largest quantities of aluminum but there is another possible use which would involve immense quantities. Since iron rusts easily, it must be coated wherever it is exposed to air and damp. Tin and zinc have been used for such coatings for years, but now, by the Fink process, a satisfactory aluminum coating has been obtained. Thus aluminum might be used to coat structural steel, and especially for coating the strong, light-weight alloy steels possible for airplane building. Aluminum itself has certain defects. It must be heat-treated with extreme care in order to keep its essential strength. Stainless steel is excellent for airplane bodies, but it is expensive, so an ordinary light, high-strength steel, with an aluminum coat would probably be both cheap and completely satisfactory.

Steel, however, remains in a safe place as the strongest and cheapest of the industrial metals. The steel of today, however, is not just steel. It has dozens of different compositions or alloys and uses. One of the significant developments of steel which has made possible machining and standardizing of parts is the development of high-speed tool steels. When a tool is used to cut metal no matter how sharp the tool may be, it gets hot and so does the metal that is cut. The older carbon tool steels had to do their work slowly and carefully or they lost their hardness and strength. By a lucky accident, however, a tool steel was produced which would cut four or five times as fast without being damaged. All the old machines had to be thrown out or changed and the output of steel manufactures jumped enormously. Now Fansteel Products Co. has a new material which is a mixture of tungsten and titanium carbides cemented with cobalt. It will cut steel perfectly, no matter how great the speed.

The steel picture is made up of a great number of alloys, new uses and ever-developing processes of manufacture. The Ludlum Steel and Allegheny Steel have led in the development of both. The steel industry can now supply some 500 different products in 100,000 grades, shapes and sizes. Single-piece automobile tops, kitchen knives, parts of machines, bridge girders, what not, are all of steel. A lot of experimenting has gone forward lately, and the industry can now produce plain carbon steels which are light, uniform, and strong enough to be used in place of many alloys.

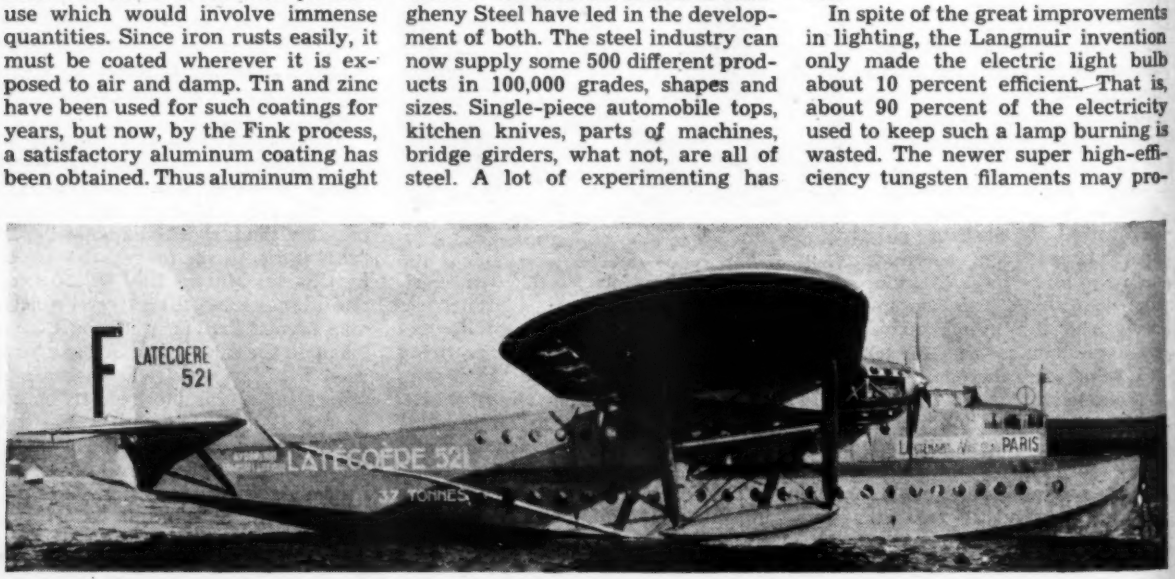
Copper, brass, zinc, lead, magnesium and other metals are all going through the experimental laboratories of metallurgists and emerging transformed, ready for new uses. The story of metals in applied science is too long and complicated to tell here, but if there is anywhere that the present almost seems to touch the future it is in the development of metals.

Bigger and Better Bulbs

Although Edison did a fine job as an inventor in giving us the electric light bulb, that little bulb compared with those of today was like an old Model T beside a brand-new Mercury. And speaking of mercury, there's a new kind of lamp called a mercury-vapor lamp. There's also a mercury switch, both the work of the General Electric Laboratories.

As a matter of fact, most of our artificial lights are very poor and very inefficient indeed, when compared with what the firefly can do with the product of his own little power-plant. Man can't equal the firefly—yet, by a good long way. But our artificial lights are getting better all the time. The Edison lamps were all based upon the incandescence (white-heating) of fine metal threads, usually tungsten, in a vacuum. Dr. Irving Langmuir improved the tungsten lamp by filling the lamps with argon, an inert gas. The modern Mazda lamps were the result.

In spite of the great improvements in lighting, the Langmuir invention only made the electric light bulb about 10 percent efficient. That is, about 90 percent of the electricity used to keep such a lamp burning is wasted. The newer super high-efficiency tungsten filaments may pro-



This giant French seaplane, soon to make survey flights between the United States and France, depends for its strength and safety upon duralumin, an aluminum alloy. Airplanes depend on the scientist as well as the pilot.

duce better light for less current.

But another type of lamp from the incandescent bulb is now in the experimental stage. These lamps don't use filaments at all, but a gas in a tube made to glow by the passage of electric current. The mercury vapor lamp, which gives a good light but turns skin yellow and lips purple is one type. The sodium vapor lamp which is very, very yellow is another. And the well-known neon lamp is a third. None of these lamps is completely satisfactory. Since man prefers something that resembles sunlight, he dislikes the colors produced by these three types of gas lamp.

The General Electric Company is also working on a mercury light switch which apparently will not wear out. This switch renews its surface of contact all the time, since mercury is a fluid metal. Many kinds of metallurgical and electrical research united in the mercury switch. This "meeting of minds" occurs constantly today in any field of applied science.

This 90-ton machine is the Westinghouse atom smasher. It may play a gigantic role in the forward march of science.

Why Smash the Atom?

The atom is presumed to be the smallest possible unit of which all matter is composed. It is so tiny that it cannot be seen even under a microscope and 100,000,000 atoms placed end to end would hardly form an inch-long chain.

But these tiny units, which have practically no weight, are the building blocks of nature. Atoms combine with other atoms to form a chemical combination called a molecule. Man can never understand what matter is, really, unless he has some idea of what an atom is. In 1897 Sir J. J. Thomson discovered that atoms consisted of two parts, one comparatively massive, the other very light. These light particles in the atoms were electrons. So, Thomson discovered, the building block was not a simple block, but resembled more nearly a strawberry with from 1 to 92 seeds on it. These seeds were the electrons which carry a negative charge, while the heavy part of the atom carried an opposite, or positive charge of electricity. Sir Ernest Rutherford in 1911 suggested that, instead of being solid like a strawberry the atom consisted mostly of empty space. He suggested the comparison with the solar system. The heavy part of the atom was, he said, the sun. Moving around it were grouped the planets. These moving parts are the electrons.

Rutherford hit upon the idea of using the very powerful high speed particles given off by radium to bombard atoms and break up their infinitesimal solar systems. The bombardment forced the atoms into new combinations and taught the physicists a great deal about matter. This research of atom-smashing is called nuclear physics, because it works mainly with the nucleus (the sun) of the atom. Until recently all the atom-smashing that was done went on in well and expensively equipped college laboratories.

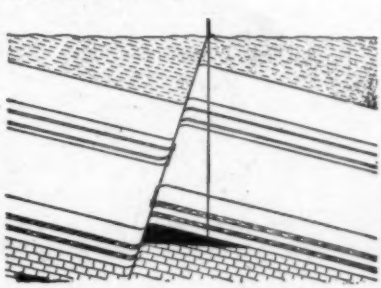


Diagram of a fault in the earth.

But today the Westinghouse Electric and Manufacturing Company has undertaken to do a little atom-smashing of its own. The Westinghouse machine is 65 feet high and weighs about 90 tons. It looks like an enormous metal pear. Quite a big thing to break up the tiniest thing in the world. But tiny as the atom is, it can't be broken up without the use of tremendous force. The idea is that lots of atoms will make new combinations if they can be broken up and then caused to collide with other atoms at enormous speeds. One of the great results of atom-smashing is that there will be man-made substitutes for radium, now one of the rarest and most expensive of the elements in the earth. Such a simple substance as table salt can be made radioactive by atom-smashing, and then perhaps cancer patients needing radium treatment can simply swallow a spoonful of table salt and get as much good from it as they can from being exposed to the rays of $100,000,000 worth of radium.

It is hard to say what practical uses atom-smashing may have in the future, but there can be no doubt that experiments which help man to understand the nature of matter will lead him farther along the path of knowledge.

Oil for the Machines

Back in the old days, many and many a small-town business man was gulled into buying "wild-cat" oil stock in the hope of being able to retire wealthy. The chances were that some diviner, or "dowser" with a forked stick thought he had found an oil well in somebody's back yard. If he didn't think so himself, he at least persuaded others that he thought so.

The "dowser" had a lot of clever tricks for finding oil. Whether he actually ever found it is beside the point, which is that the day of the dowser is gone forever. The geologist and the physicist, or the geophysicist (who is both), has taken into his trained hands the problem of finding the oil which machinery simply must have to keep going.

The first step in exploring for underground oil deposits was taken by the geologists. Geology is a pretty

(Continued on page 36)

Left to right above: 1. General Goethals, civil engineer, honored for his part in building the Panama Canal. 2. Naturalist Darwin. 3. Stamp commemorating Thomas A. Edison. 4. Turkish stamp honoring Mme. Curie. 5. French stamp in homage to Pasteur. 6. Austrian stamp honoring Baron von Welsbach, inventor of gas mantle. 7. Stamp for Volta.

Science in Stamps

Conducted by Frank L. Wilson

SCIENTISTS occupy far more than a single niche in the Philatelic Hall of Fame. Research in physics, chemistry, and biology, in electricity, in mechanical and civil engineering, in aeronautics, exploration, radio, and medicine are all honored through the medium of the postage stamp, as this page shows.

Benjamin Franklin (see page 3) leads the list of those commemorated by portraits on postage stamps, though, of course, in his case it was chiefly as a statesman rather than as a scientist. The first issue of regular stamps of the United States in 1847 bears his portrait and since that time his likeness has graced our stamps almost continually. Second American of note to be specially honored by a commemorative issue was *Thomas Alva Edison* on the occasion of the fiftieth anniversary of the incandescent light in 1929. Edison stands forth as the foremost of American inventors and scientists. His patents number more than 1,200 and some of his greatest inventions include the incandescent light, the phonograph and the cinematograph.

Commemorative stamp issued honoring Wright Brothers.

Santos Dumont on Brazil stamp for Aeronautics work.

The memory of *Andre Marie Ampere*, French physicist and mathematician, whose development of the electro-dynamic theory and original views of the identity of electricity and magnetism did so much for the advancement of science, was preserved on a special stamp issued by France in 1936. His name is perpetuated in the Ampere, the unit of flow of the electric current. The Italians honored *Count Alessandro Volta* in 1927 with a special stamp. Volta was likewise a physicist, whose research included the invention of the eudiometer, the electrophorus and the electroscope. Italy also paid tribute to *Luigi Galvani*, a physicist for whom the galvanic cell and galvanometer were named.

Jugoslavia honored *Nikola Tesla* who made many important contributions to our knowledge of electrical science. The name of *Guglielmo Marconi*, Italian inventor and electrical engineer, was inscribed on a special stamp issued in 1938 to pay nomage to his achievements in radio. Marconi's first patent for wireless telegraph apparatus using electricity was taken out in England in 1896. In 1924 he invented the beam system of concentrating wireless rays and since then has added several improvements in radio telegraphy.

France has honored *Louis Pasteur*, eminent French chemist, with a special set of stamps. Pasteur explained fermentation as the result of the presence of a microorganism and thus laid the foundation for the science of bacteriology. France honored, also, *Pierre* and *Marie Curie* (See *Schol.* Feb. 12, 1938, p. 5) with a special semi-postal stamp. Turkey, too, included Mme. Curie in her "Famous Women" series with a special stamp in 1935.

The memory of *Charles Darwin*, English naturalist who sailed on the famous *Beagle* in 1831 to the Galapagos Islands is commemorated on a special issue of stamps by Ecuador. Darwin's investigations led to the discovery of the theory of natural selection and the publication of his *Origin of Species* in 1859 was a landmark in biological science.

In the field of aeronautics we have *Pilatre de Rozier* who did much research in the theory of balloons, represented on a special French stamp.

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12. IT'S A GIFT

By Gay Head

OF ALL dumb things! To have lost her last year's Christmas list. It was *too* exasperating. She'd practically turned the desk upside-down, and all sorts of long-lost things had rolled out—letters, lipsticks, dance programs, a faded gardenia or two, a belt buckle, a torn bathing cap—even that old diary she'd searched for high and low, but No Christmas List!

Jerry flung herself on the bed in a gesture of despair. Polly Penny, who'd been sitting by, watching the performance, laughed at Jerry's expression of hopelessness.

"Don't give up," chided Polly. "You haven't looked under the mattress yet. And there's still the top shelf of the closet. Jerry, I don't want to sound like a prude, and, goodness knows, I'm no model of perfection, but why don't you clean out that desk more than once a year?"

"Oh, Polly, don't fuss at me now. Just think—think—think! Where could it be? If you'll lead me to it, I promise faithfully never to let the desk get in such a mess again. Without that list I'll be sure to forget my best friend. Oh, horrors!"

"You've looked everywhere I can think of," said Polly. "Come on, I'll show you a grand way to make out a new Christmas list. See, here's mine—not finished—but you'll get the idea."

Jerry looked at the list, but she didn't get the idea, at all. The thing didn't even begin to make sense. It read:

Susie ..... bottles
Sonny ..... monkeys
Uncle Matt ..... bridges
Aunt Minnie ..... elephants

"Polly Penny, one of us has lost our minds, and I think it's you!" Jerry exclaimed.

Polly smiled. "Why, it's perfectly simple. You write down the name of some one thing that person dotes on."

"And I suppose Aunt Minnie dotes on elephants, and has them roaming all over the house."

"Oh, no, you goof, just on the mantelpiece. They're ivory elephants—a whole string of them. I thought I'd get her a tiny one to tag along at the tail end. See? Now Uncle Matt is crazy about bridges, so he gets a picture of the new Golden Gate or some other bridge. Susie—well, she's always begging me to save old perfume bottles for her (she has a dresser top full of them, but that's the way she likes it) and I saw an old-fashioned one at an antique shop the other day. She'd love it! As for Sonny boy, aged four, he hasn't talked of anything except monkeys since his first visit to the zoo last month. Why not a picture book of monkeys?"

"Oh, Polly, don't fuss at me now. Just think—think—think! Where could it be?"

"Oh-hh-h. You connect the people with their hobbies, or best-likes, and then the idea for the right gift just pops up, doesn't it? Let's see about some on my list. There's Betty—well, anything blue. But—oh, I know. She gets more mail than any other six girls, so she must write lots of letters. Blue-bordered stationery for Betty. Your idea is grand for girls, but boys—honestly, Polly, I'd rather buy gifts for fifty million girls than for one of my three boy cousins."

Polly sighed sympathetically. "Don't I know it? Think of me—with five brothers. As long as they're at the choo-choo train age, it's easy, but those 14-year-old twins, Bill and Sid are much more persnicketty, even than girls. And do you know they had the nerve to present me with a petition *not* to give them neckties any longer? Said they'd been suffering from my brocade complex for years and that, like all girls, I gave the kind of ties *I* liked instead of what *boys* like. (Come to think of it, both of them do buy striped ties!) But, anyhow, I asked them to tell me what boys *do* like to receive. Here are some of the things they mentioned: wool mufflers, gloves, matched sets of tie and handkerchief or tie and scarf (and there really are some spiffy ones in the stores this year)—then, cameras or good he-man books on travel, adventure, or news correspondence. They said tie clasps, wallets, pen knives, and pen and pencil sets were all right, provided the victim didn't 'already have 'em sticking out every pocket'. Bill's idea of the de luxe gift was a set of military brushes, but Sid, the Rover boy in the family, said 'Humph, give me a good sharp hunting knife.' "

"After the Tie Rebellion I don't know whether I'd dare give him such a dangerous weapon," laughed Jerry. "Polly, I was wondering — about Tom. Would I be too bold?"

(Concluded on next page)

"Of course not, silly. Mother says a girl shouldn't give a boy personal gifts and that she should never be the first giver. That *is* too bold. But, heavens, Tom's been giving you gifts for years."

"And what grand ones! He has never failed to give me something I liked. Remember that monogrammed vanity? And the diary with my initials on it? Of course, it's easy to see my weakness for monograms—but how about that luscious jeweled evening bag I got last Christmas? There's a gift any girl would love."

"Well, I wouldn't turn up my nose at a leather pocketbook for that matter! But, you know, I'm really pining for one of those leather manicure sets. Why don't boys ever think of things like that?"

"Or makeup sets? They all know we use the stuff. Personally, I wouldn't be a bit insulted if somebody gave me one of those beautiful big jars of bath salts or a box of bath powder. Of course, perfume is always a lovely gift, provided you don't get a flavor that absolutely clashes with your personality. A boy once gave me a huge bottle of some heavy Oriental stuff. It might have been nice for a deep, dark brunette, but for me—with my freckles—whoa!"

Just then the doorbell rang. Jerry whisked a comb through her hair and a powder puff over her nose and dashed downstairs. When she opened the door, there stood Phil. Bashful Phil Strong coming to call? Alone? Perhaps his car was out of gas and he'd come in to telephone.

"Hello, Phil, won't you come in?" asked Jerry.

Phil looked sheepish and began to stutter. "Why—uh—n-n-n-no, thanks, Jerry. Y-y-you see, the Stags—well, we—" Phil saw Polly coming down the steps. This was too much. It was too silly to tell them the Stags had written an answer to the Glamour Girls' "Pet Peeves." But what excuse for being there? "We—uh—" and the words came out in a rush— "we'd like you to come to our Christmas party."

"Party?" came a voice from the shrubbery. Tom, Jack, and Pete dashed up on the porch.

"What a guy!" exclaimed Tom. "He was supposed to hand you an important document, The Stags Come-Back, and instead—well, now we'll *have* to have a party! And Phil, you're it. Your idea. Your party."

For a moment Phil looked as if he'd been hit with a blackjack. Then he rallied—with a big grin. "Why, sure, Tom, that's what I meant. You boys leave everything to me. That is, if we can count on Jerry and Polly to be there."

"We'd love to," said Jerry, winking at Polly. "But why don't you boys come in? I made some fudge this afternoon!"

Fudge? They all but fell in—Phil first!

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Benjamin Franklin

(Concluded from page 6)

fense—a difficult undertaking in a Quaker community. He then designed a "battery" for the defense of the city. It was a log fortification, equipped with cannon. In 1751, he undertook with a friend the establishment of a hospital "but," he wrote, "the proposal being a novelty in America, and at first not well understood," it was difficult. He accomplished it.

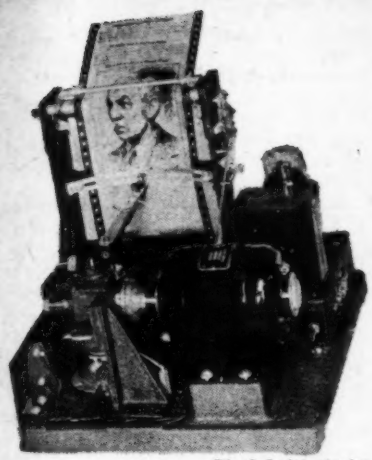
Soon after, he began to study the inconvenience of mud in the streets and he designed a plan for paving the city and, which was more remarkable, made the city pay for it. Until then, improvements in the public welfare had been paid for by private enterprise.

The globe lamps imported from London "we found inconvenient in some respects: they admitted no air below; the smoke, therefore, did not readily go out above, but circulated in the globe, lodged on its inside, and soon obstructed the light they were intended to afford; giving, besides, the daily trouble of wiping them clean; and an accidental stroke on one of them would demolish it, and render it totally useless. I therefore suggested the composing them of four flat panes, with a long funnel above to draw up the smoke; by this means they were kept clean, and did not grow dark in a few hours, as the London lamps do, but continued bright till morning, and an accidental stroke would generally break but a single pane, easily repaired." So, thrifty, utilitarian Franklin! Lamps of this design were used in America until the electric arc changed it.

The change in the colonies during his lifetime was remarkable. It was not all, of course, due to his invention or his effort, but so much of it was that the achievement still seems hardly credible. By the time he was engrossed in foreign affairs to the exclusion of invention at home, his stimulus had provided civic organization and pride, new urban standards, new health and new defense; a new journalism, a new education, new care of the sick, a new attitude toward entertainment, temperance, personal hygiene, public and private thrift; a revolution in science and in the attitude toward it; a profound change toward religious tolerance and the admission of free-thinking; a new interest in industry and manufacture, an epidemic of reading and writing and those novelties which were at once enlivening and relaxing —sorely needed in the rigid solemnity of adolescent America—of wit, burlesque and good-natured laughter.

"Mine ancient humor," Kipling makes the American Spirit say of the American—"Mine ancient humor saves him whole." Franklin invented both the humor and the American Spirit.

Condensed from *March of the Iron Men*, by Roger Burlingame, by permission of Charles Scribner's Sons, publishers.



Finch Laboratories

What the facsimile receiving set looks like, when attached to your radio set.

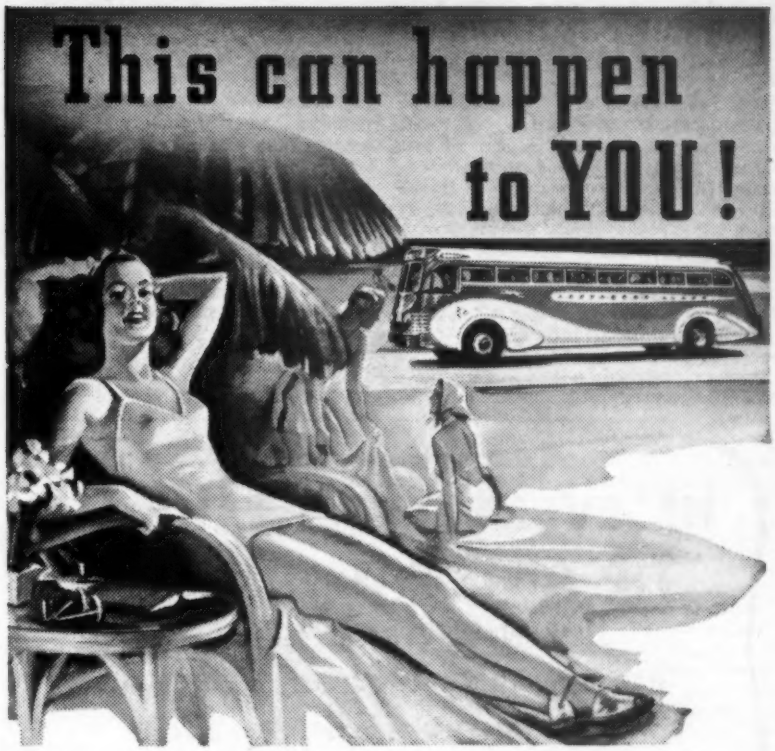
March of Inventions

(Concluded from page 12)

as the technical problems. Will people prefer television to, say, a play or a movie? What kind of programs will they want? Who will supply them? Who can pay the cost of a one-night play for television audiences?

12. Facsimile Transmission

Get a paper, hot off the radio. Instead of listening to the brief news broadcasts that come on in the morning, you can walk to your radio—if it has a facsimile receiving set—and tear off a yard or two of news for the breakfast table. If there's a new Public Enemy No. 1 or a New Public Benefactor, you can see his picture. You can see what the stores are advertising and look at the overnight map of Europe. The little god in the machine which gives you your newspaper by radio is the photoelectric cell. At the radio station, a sending machine runs off the news, pictures, and so forth, as they are assembled in a real newspaper. The whole assemblage is rolled up like a pianola roll and set in place in the sending machine. Then the photoelectric cell and the ether waves go to work on it. When the "electric eye" scans the page, it sends back a full reflection from white, from black no reflection, and from grays partial reflections. The photoelectric cell changes these reflections into electrical impulses and your facsimile set plucks them out of the air. At the same time as the broadcasts are going out they arrive at your machine and move a stylus (point) across a carbon-backed paper, which draws pictures and prints news for you. All you have to remember to do is to keep a supply of paper on hand and turn on the facsimile receiver before you go to bed. By morning there will be a neat little roll of news all ready to be read. Facsimile transmission is still in an experimental stage although eight broadcasting stations are using it. It may put the newspapers and the press bureaus out of business.



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Indu[illegible]try's Brains

(Concl[illegible]ed from page 31)

new science, [illegible]nd every geologist will admit there i[illegible]ill a lot to know about the study o[illegible]he earth. But in the search for oi[illegible]e geologists knew certain things. T[illegible]y were positive that oil did not lie ir[illegible]e underground rocks in great lake[illegible]r ponds. They believed it occupied t[illegible] tiny open spaces between the sar[illegible] grains in sandy rocks or small hol[illegible]n limey rocks. They knew you co[illegible] fill a quart measure full of sand, p[illegible]s it down and still be able to pour i[illegible] a half pint of water. Therefore oil c[illegible]ld not be found where there were [illegible]rous rocks.

Because there is water in wells and mines, the geologists also reasoned that rocks, down to unknown depths, are saturated with water. If both oil and water are present in the pores of a sloping layer of rock, the oil, being lighter than water, would travel upward through the pores. In certain areas, however, porous rocks are overlaid with non-porous rocks. When this happens, the non-porous rock would cause the oil to form an underground pool. The ideal condition is where a sand or sandstone were folded into an arch, by some past upheaval of the earth, and covered over by a clay or a non-porous shale. This kind of rock formation is called an "anticline," and the geologists expected to find oil wherever there was an anticline, or arch. Another favorable kind of earth-formation was a dome, which was an underground formation shaped exactly as its name suggests. Still another was where a fault occurred. A fault is made when a part of the earth's crust slipped at one time (see page 31).

So far, so good. But it happened once in a while that a "wildcatter" found oil in areas which didn't fit the geologists' theories. The East Texas Pool, for example, one of the richest in this country, was discovered more by good luck than good sense. So the geologists decided they had to have some way of actually "looking" at underground formations.

In order to get the greater fund of information needed, the geologists teamed up with the physicists and the oil industry to use all the information at hand. One of the most obvious things to study was the "drilling log" which is a record of all the kinds of rock, sand, clay and what not that the drill brought up to the surface, together with measurements of the depth underground where each was found. The scientists put all these samples under all kinds of tests and then made a map of the underground landscape.

But although the drill could give the scientists all the information they needed it was too expensive. A number of "dry holes" would have to be drilled to tell the story of a territory. Exploration underground needed the help of delicate and accurate instruments, expensive equipment, and expert drilling techniques in order to reach deep underground pools. Here's where the physicist came to the aid of the geologist. He had developed sensitive instruments to determine the pull of gravity, how fast electrical vibrations would travel through different types of rocks, etc.

Of course it is much more expensive to explore for oil at 10,000 feet than at 2,000. Only the oil industry has enough money to invest some $36,000,000 in oil crews, dynamite, instruments, oil-field equipment, expert staffs, and what not. It spends about $100,000 a day just to keep this expensive investment going. The sky is the limit to what the industry can spend looking for oil. But at least, with all the technological improvement in exploration and drilling that has been made within the past few years, the industry has a much better record for real finds than the "wildcatters" made in their day.

Another silver lining is that, in spite of the gloomy predictions that we would be oil-less in a few years, new discoveries are being made all the time. At present the world uses about 5,000,000 barrels of crude oil a day, or nearly two billion barrels a year. And the need for oil is not declining. On the contrary, oil men say that oil exploration has advanced "far enough to be regarded as an inexact science, instead of merely inexact." But there's still a lot of luck in it, and a lot of gambling. The oil companies keep in close touch with all the advances the geophysicists are making.

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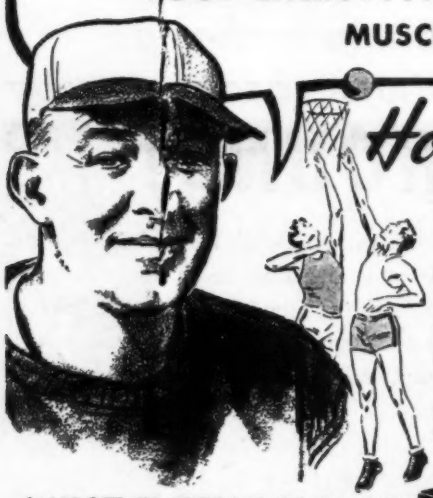

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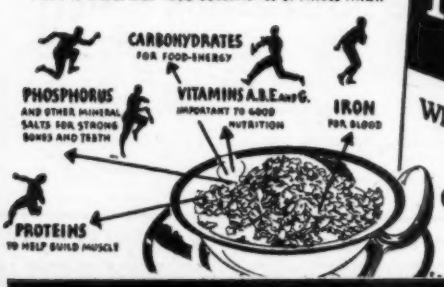
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Journey to the Forks

(Concluded from page 7)

little time longer in the mint patch, watching the road. A bright-faced nag came around the creek curve, lifting her hoofs carefully along the wheel tracks. Quin Adams was a-straddle, riding with his feet out of the stirrups, for his legs were too long to fit. Quin drew the reins beside us, looking down where we sat. We stood up, shifting our feet.

"I reckon John Baldridge is sending his young 'uns down to school," Quin said, drawing up his heavy cheeks, laughing. "Going down to take a spell in the Fork-school, and git a mess o' fool notions."

"Poppy never sent us," I said. "Never said go, nor stay. We made our own mind."

Quin lifted his hat and scratched his head.

"I never put much store by all them fotched-on teachings, a-larning quare onnatural things, not a grain o' good in God's creation."

"Hain't nothing wrong with larning to figger and read writing," I said. "None I ever heard tell of."

"I heard they teach the earth is round," Quin said, "and that's agin scripture. The Book says plime-blank hit's got four corners. Who ever seed a ball had a corner?"

Quin crossed his left leg over the nag, sitting sideways in the saddle. "They's a powerful mess o' fancy foolishness they teach a chap these days, a-pouring in tell they got no more jedgement than a crawdad walking backards, a-grinding their brains down with book-reading. I allus said a leetle larning was a good thing, sharpening the mind like a saw blade, but too much knocks the edge off the points, and darks a feller's reckoning."

Quin put his leg back on the other side of the nag and drew reins to go. "Hain't everybody knows what to swallow, and what to spit out," he said. "If I was you, I'd play hardhead down at the Forks, and let nothing but truth git through my skull. Hit takes a heap o' knocking to git a thing proper anyhow, and the harder it's beat in, the longer it's liable to stay. I figger the Lord put our brains in a bonebox to sort o' strain out the devilment and quare notions."

The nag started off, lifting her long chin as the bits tightened in her mouth. Quin called back to us, but his words were lost under the sound of hoofs.

"I bet what Quin says is the plime-blank truth," Lark said, looking back toward the disappearing nag. "I'm scared I won't know what is straight and gospel, and what hain't. If'n I was growed up to twelve like you, I'd know. I'm afeared I'll swallow a lie-tale."

"Quin Adams don't know square to the end o' everthing," I said.

We went on. The sun-ball reddened behind the beech trunks on the ridge-top, mellowing the sky. Lark trudged beside me, holding to a strap of the saddlebag I carried, barely lifting his feet out of ruts as he walked. His teeth were set against his lower lip, his eyes downcast and dark.

"I knowed you'd git dolesome," I said.

Purple martins flew down the valley when the sun-ball was gone, fluttering sharp wings, slicing the air like a blade. A chuck-will's-widow called. Shadows thickened in the laurel patches and under the creek willows.

We came upon the Fork-school in early dark, and looked down upon it from the ridge. Lights were bright in the windows, though the shapes of houses were lost against the hills. We rested a last time, listening. No sound came out of all the strange place where the lights were, unblinking and cold.

I stood up to go, lifting the saddle-bag. Lark got up too, but we waited, dreading the last steps.

"I ought never thought to be a scholar," Lark said. His voice was small and tight, and the words trembled on his tongue. He caught hold of my hand, and I felt the blunt edge of his palm where the fingers were gone. We started down the ridge, picking our way through stony dark.

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Words of the Week

Vowel Sounds: āle, câre, ȧdd, äh, sofá; ēve, ĕnd; īce, ĭll; tōe, ôrb, ŏdd; fōōd, fo͝ot; cūbe, ûrn, ŭp; oil; out. **Consonant Sounds:** this, thin. **In foreign words:** ü—French u, German ü; ö—German ö or oe; y at end of syllable—French liquid l; ĸ—German guttural ch; ɴ—French nasal m or n. In words of more than one syllable, accented syllables are italicized.

Ampere, Andre Marie (ăn-*drā* mä-*rē* ăn-*pĕr*), p. 32.

articulate (är-tĭk-û-lāt), p. 3. To make a thing *articulate* is to give distinct expression to it.

Batista, Fulgencio (fo͝ol-*hĕn*-sē-ō bä-*tēs*-tä), p. 25-S.

cellulose acetate (*sĕl*-û-lōs *ăs*-ĭ-tāt), p. 12.

De Kruif (dä krīf), p. 24-E.

delegate, p. 6. To commit or entrust to someone else.

electrotherapeutics ē-*lĕk*-trō thĕr-ä-pū tĭks), p. 4. The use of electricity to cure disease.

hydrogenation (hī-drō-jĕn-*ā*-shūn), p. 11.

hydroponics (hī-drō-*pŏn*-ĭks), p. 10.

hysteresis (hĭs-tûr-*ē*-sĭs), p. 18-E.

Machado (mä-*chä*-dō), p. 25-S.

Marconi, Guglielmo (gōōl-*yĕl*-mō märkō-nē), p. 32.

meterology (mē-tē-ôr-*ŏl*-ō-jē), p. 3. The scientific study of weather.

Pilatre de Rozier (pē-*lâtr'* dä ro-*zhyā*), p. 32.

pyroxylin (pī-*rŏk*-sĭ-lĭn), p. 11.

spinneret (*spĭn*-ûr-ĕt), p. 11. A tube or plate with fine holes through which a liquid is forced in making artificial threads.

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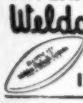

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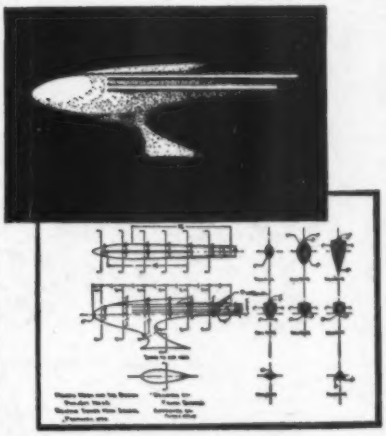

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